Sale and Billing Information System of Sittipat Company

by
Mr. Sittipat Petchawat

A Final Report of the Three-Credit Course
CS 6998 System Development Project

Submitted in Partial Fulfillment
of the Requirements for the Degree of
Master of Science
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Project Title	Sale and Billing System of Sittipat Company
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Academic Year	July 2006

The Graduate School of Assumption University has approved this final report of the three-credit course, CS 6998 System Development Project, submitted in partial fulfillment of the requirements for the degree of Master of Science in Computer Information Systems.

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ABSTRACT

This system development project presents the analysis and design of Sales and Billing Information System. The project is developed to solve the problems of inconsistent data, untimely service, human error and opportunity loss. The projects are expected to increase the efficiency of work, reduce time consuming, decrease cost and make more profitability.

The study of this project begins with the required definition and analysis of the existing system. Information system analysis and design tools such as context diagrams, data flow diagram, data dictionary, and structure charts are used to analyze both the existing and proposed systems. Candidate solution matrix is also used to compare various alternative in order to come with the most effective solution. Capital budgeting models such as the payback methods, the cost-benefits ratio, and the net present value are used to evaluate the proposed system.

It was found that the new computerized system is implemented using LAN 10Base-T with 1 server, 10 clients and printers. Software for the proposed system are Windows XP, MS Office 2003 and Visual Basic upon payback method, it shows that the initial investment will pay itself after 2.4 years. In terms of degree of achievement, the proposed system can process data about 3 times faster than the existing system.

To further improve the proposed system, it is recommended that a Web-base solution should be developed and implemented. This will allow user and customer accessing the system more easily and faster.

ACKNOWLEDGEMENTS

Several people have made contributions to this project. The writer would like to acknowledge their efforts and thank them for their contributions.

He would like to thank Dr. Aran Namphol, his project advisor, for the advisor's valuable suggestions and advice given in to preparation of this project.

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I. INTRODUCTION

1.1 Background of the Project

The Sittipat Cosmetic Company was established at Petchaburi province in 2001. This business has produced many cosmetic products, such as lip gloss, eye shadow, brush on and skin care products. Firstly, the productivity had produced small amounts and served only to a small group of customers. But now everything changed, the business was growing up at this time. The owner found the way to make more profit by upgrading the necessary production and billing system.

In the existing system, a variety of customer's orders and the manual billing system made problems everyday. The owner expands the production part to support the customer's demand by hiring more workers and separated them into parts such as prepare producing, manufacturing and transporting.

Secondly, customer and billing management system are the most necessary parts to be changed. This project has scope into the billing system because it will make more profits to the owner. Computerized system is used to keep all information because of its accuracy and reducing time. In the future, this system will help the owner to keep business growing and be stable when the high variety of customer demands or large volume of billings are coming.

1.2 Objective of the Project

The proposed system of the Sales and Billing Information System had been developed to improve the current workflow of the business to get a better performance, reduce costs and the process time.

(1) To study the sales and billing information system of Sittipat cosmetic company and identify problems and opportunities.

(2) To analyze the current processes and procedures of Sittipat cosmetic business in order to assist and support management requirements as well as operation performance.

(3) To automate the record keeping task and provide timely and accurate reports.

(4) To develop and test the new program for the information system of the Sittipat cosmetic company.

(5) To increase the work flow of the organization.

(6) To reduce unnecessary expenses of the organization.

1.3 Scope of the Project

The expected result of the proposed system is to improve the performance of the organization and to fulfill the requirement of the user. The details of the scope consist of:

(1) Maintaining data about company's products, sales volume on daily, monthly and yearly, customer and customer orders.

(2) Recording sales volume so that the system can make sales performance evaluation to support decision making of the owner.

(3) Providing necessary exceptional reports to assist management in making the right decision.

1.4 Deliverables

The details of the deliverables on Sittipat Cosmetic Company proposed system consist of:

(1) Business requirement

(2) Technology requirement

(3) Design specification

(4) To decrease workload and unnecessary working process

(5) To reduce paper and unnecessary documents

(6) Able to update information in the long term

(7) Increase opportunity cost for making profits

(8) Generate the report

(a) Sales report

(b) Payment report

(c) Delivery Slip report

(d) Invoice

1.5 Project Plan

This project has been surveyed since April 2006. It will be delivered to the managing director in July 2006. The system development plan presented in Gantt Chart Figure 1.1

No.	Task Name	April				May				June				July			
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
	I. Analysis of the existing System																
1	Define the Objective and Scope																
2	Study the Existing System																
3	Identify the Existing Problems																
4	Study the Existing Computer System																
5	Develop Context Diagram																
6	Develop Data Flow Diagram																
7	Cost and Benefit Analysis																
	II. Design of the Proposed System																
8	User Interface Design																
9	Report Design																
10	Database Design																
11	Network Design																
12	Program Design																
	III. Implementation of the Proposed Systems																
13	Program Coding																
14	Program Testing																
15	Hardware Installation																
16	Software Installation																
17	Conversion																

Figure 1.1. Project Plan of Sales and Billing Information System

II. THE EXISTING SYSTEM

2.1 Background of the Organization

Sittipat Cosmetic Company was established on 2001 which produces and sells cosmetic products in brand 'BYS Be yourself'. There are five existing departments consisting of the following:

(1) Customer Department

(2) Delivery Department

(3) Accounting Department

(4) Production Department

(5) Research Department

Nowadays, there is very high competition in the cosmetic market in terms of production, cost of product, quality of product and many more. To survive in the market, some processes must be adjusted such as reducing cost, reducing consuming resource, and reducing time. The computerized system must be developed instead of the manual system to support the company and increase the satisfaction of the customer. The organization chart is shown in Figure 2.1.

2.2 Current Problem and Areas for Improvement

The manual system generated many problems as follows:

(1) The customer information is hard to find and hard to recall the history and data of customer. Because of the large number of customers they must generate many customer data. In paper record it is hard to search customer data and the lack of time has occurred.

(2) The Order of customer problem. In customer order, there are many kinds of products and high volume. The wrong order or inaccuracy of order has occurred when a large number of customer orders come.

(3) The report system. It is a waste of time to generate a report with the manual system. The report is necessary to know the product's sale volume data. The company uses it to create the production strategy. The report makes the company know what is the product we can continue producing or stopping product line.

(4) Payment checking. The manual checking uses much time and makes work load for accounting department.

(5) Data security. The data are collected in paper file format. It is easy to lose or miss because anyone can access in data very easily.

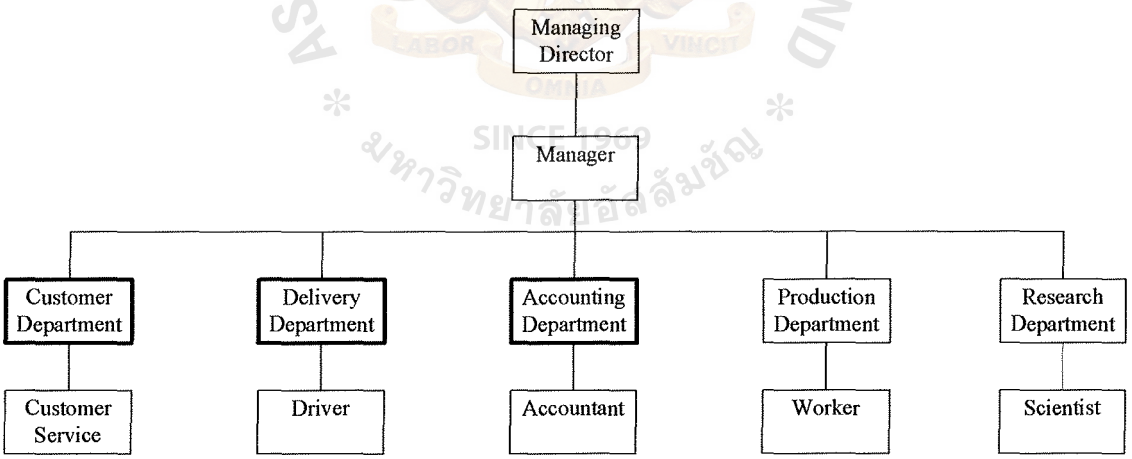


Figure 2.1. The Organization Chart of Sittipat Cosmetic Company.

2.3 Existing System

The existing system contain of Customer Department, Delivery Department, Accounting Department, Research Department and Management section.

(1) Customer Department:

The customer has to collect the customer information and customer order. They collect the customer payment.

(2) Delivery Department:

Contact directly with Customer Department to create customer order and deliver the product to customer from customer information data.

(3) Accounting Department:

Generate invoice from customer order which comes from Delivery Department and collect the customer payment data from Customer Department.

(4) Research Department:

Research Department will develop the new product and send the new product data directly to Customer Department.

(5) Management Section:

Receive the report from Accounting Department and use it in making decisions and creating company plan.

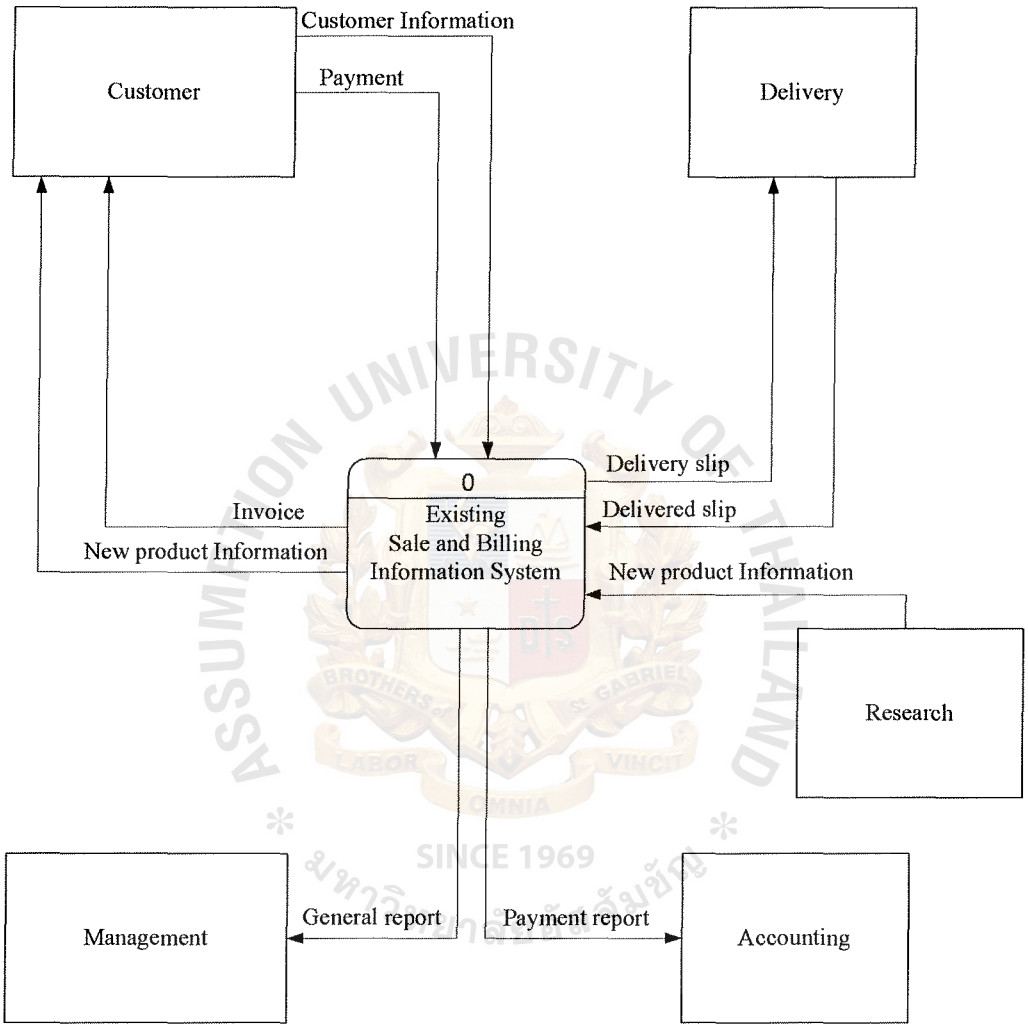


Figure 2.2. Context Level Data Flow Diagram of Sales and Billing Information System.

III. THE PROPOSED SYSTEM

3.1 System Specification

The new information system required an effective customer history including customer name, address, phone number and customer order record. The two major information will keep statistical information and it will help the management section to make business plans. It helps to predict the trend of product and we can respond to the needs of the customer.

In order to achieve the target, the new information system should have the following components:

(1) In customer part, input in the customer database kept as customer profile. This master file involves customer ID, customer name, address, phone number. This information will be available to any responsible workers.

(2) Order information, after customer profile is completed, order information is input in the order database. This consists of order number, product information, order date and amount of price.

(3) Record budget information by input customer ID, the system shows the detail of customer profile, received payment, date, amount of price. The authorized user can add, delete and update the budget of the customer record. The system generate invoice to customer.

(4) Report system, any necessary report can be automatically created and reported to management section weekly.

3.2 System Design

(1) Entity Relationship Diagram

ERD data modeling is the technique used to organize and document a system data. Data modeling, which is called database modeling, is usually a database implementation.

The ERD of the new system is shown in Appendix A as follows:

(a) A context level of entity relationship diagram

(b) A key-based attributed relationship diagram

(c) A fully attributed relationship diagram

The Data Dictionary, the table which describes the details of each entity and attribute in ERD, is shown in Appendix B.

(2) Data Flow Diagram (DFDs)

The logical Data Flow Diagrams (DFDs) are the structure analysis and design tools that an analyst can use to understand the process of the system and the movement of the data through the system.

The logical data flow diagram will indicate the flow of the requirement and the data type used in developing the program to support the new system. With DFDs, the analyst can design the file to cover the requirements of the users and support the report design of the system.

The proposed system is designed with the aim of solving the problems of the existing system as stated previously and to meet all user requirements as well. Context diagram of the proposed system is given in Figure 3.1 and level 0 Data Flow Diagram of the proposed system is given in Figure 3.2.

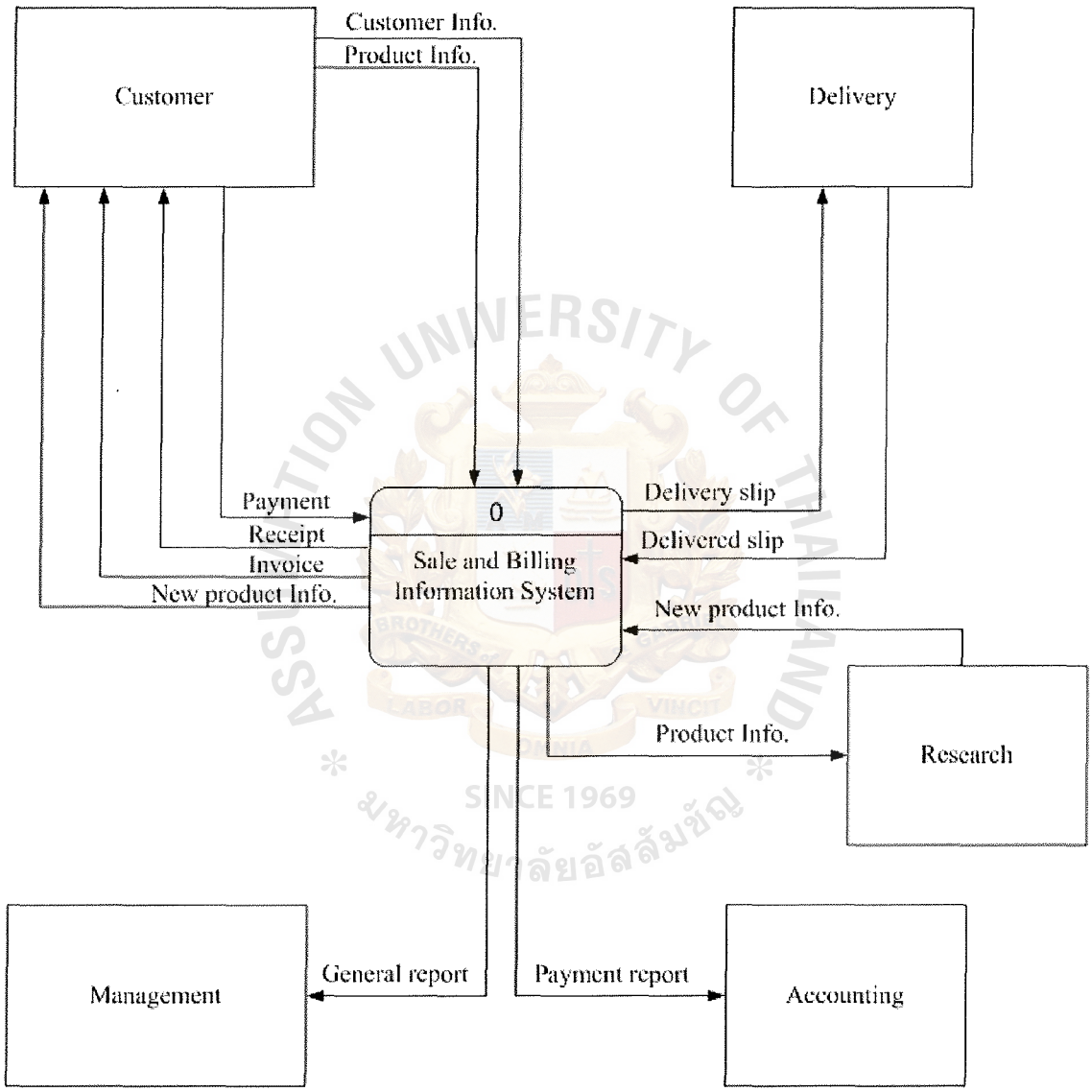


Figure 3.1. Context Level Data Flow Diagram of Proposed System.

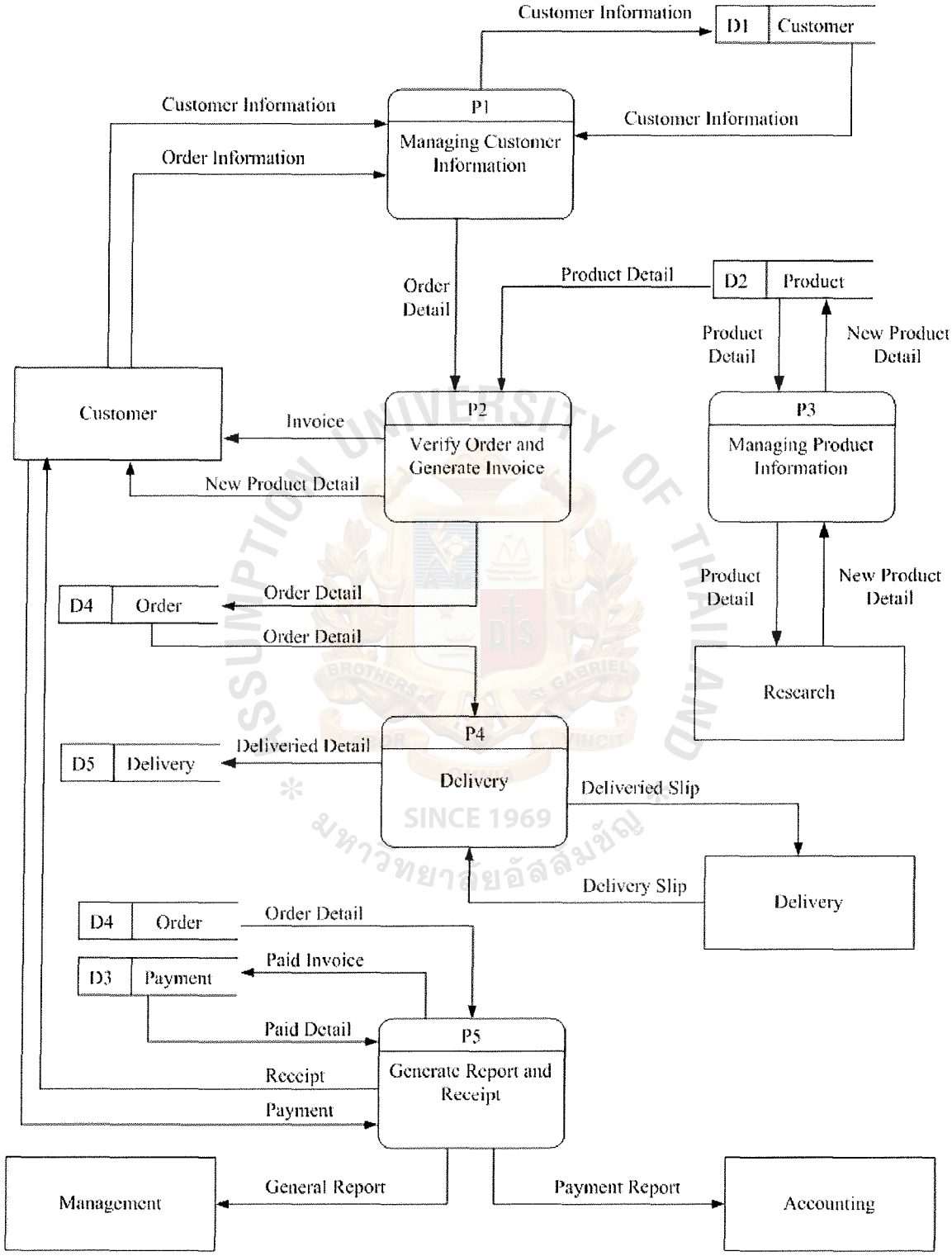


Figure 3.2. Level 0 Data Flow Diagram of Proposed System.

The details of data flow diagram of Sittipat Cosmetic Information System are shown in Appendix C, which includes:

(a) Context Data Flow Diagram

(b) Functional Decomposition Diagram

(c) Level 0 of Data Flow Diagram

(d) Level 1 of Data Flow Diagram

(e) Structure Chart

To understand the details of each process in Data Flow Diagram, the process specification is shown in Appendix D.

(3) Input Design

The input screen of the system are in many forms the various purposes are shown in Appendix E.

(4) Output Design

There are two types of system output forms that are in the form of hardcopy and in the form of displayed screen. Some reports are generated periodically such as on a weekly, monthly or yearly basis. The outputs in the displayed screen are for monitoring daily operation purposes.

All the reports and outputs generated by the system are shown in Appendix F.

3.3 Hardware and Software Requirement

The proposed system of Sittipat Cosmetic information system require the hardware as follows;

Table 3.1. The Hardware Specification for the Server.

Hardware	Specification
CPU	Intel Pentium IV Processor 2.66GHz
Memory	512 MB DDR RAM Bus 533 MHz
Hard Disk	80 GB
CD-RW DVD Combo Drive	24x10x52 X
DVD RW	8X Double Layer
Floppy Disk Drive	1.44 MB
Network Adapter	10/100 Mbps Ethernet Controller
Display Adapter	64 MB VGA Card
Display Screen	15" LCD Monitor
Keyboard	USB keyboard
Mouse	Scroll Mouse
Printer	HP Laserjet 1022
UPS	Zircon 500 VA

Table 3.2. The Software Specification for the Server

Software	Specification
Operating System	Microsoft Windows XP
Database Server	Microsoft Access 2000

Table 3.3. The Hardware Specification for Workstation

Hardware	Specification
CPU	Intel Pentium Celeron 2.53 GHz
Memory	256 MB DDR 400 MHz
Hard Disk	40 GB
CD-RW DVD Combo Drive	24x10x52 X
Floppy Disk Drive	1.44 MB
Network Adapter	10/100 Mbps Ethernet Controller
Display Adapter	64 MB VGA Card
Display Screen	15" LCD Monitor
Keyboard	USB keyboard
Mouse	Scroll Mouse
Printer	HP Laserjet 1022 EPSON Dot-Matrix LQ 2090
UPS	Leonics 500 VA

Table 3.4. The Software Specification for Workstation.

Software	Specification
Operating System	Microsoft Windows XP
Application Software	Microsoft Office 2000 Professional

Table 3.5. The Hardware Peripherals for the Proposed System.

Hardware	Specification
Printer	HP Laserjet 1022 EPSON Dot-Matrix LQ 2090
UPS	Leonics 500 VA

3.4 System Cost Analysis

(1) Cost of Manual System

Table 3.6. Manual System Cost Analysis, Baht.

Cost items	Years				
	1	2	3	4	5
Fixed Cost					
Typewriter 5 units	10,000	10,000	10,000	10,000	10,000
Calculators 5 units	1,500	1,500	1,500	1,500	1,500
Total Fixed Cost	11,500	11,500	11,500	11,500	11,500
Operating Cost					
Salary Cost					
Customer Department	50,000	55,000	60,500	66,550	73,205
Delivery Department	28,000	30,800	33,880	37,268	40,995
Research Department	80,000	88,000	96,800	106,480	117,128
Accounting Department	30,000	33,000	36,300	39,930	43,923
Managing Director	25,000	27,500	30,250	33,275	36,603
Total Monthly Salary Cost	213,000	234,300	257,730	283,503	311,853
Total Annual Salary Cost	2,556,000	2,811,600	3,092,760	3,402,036	3,742,240
Office Supplies and Miscellaneous Cost					
Stationary per annual	70,000	77,000	84,700	93,170	102,487
Paper per annual	20,000	22,000	24,200	26,620	29,282
Utility per annual	80,000	88,000	96,800	106,480	117,128
Miscellaneous	100,000	110,000	121,000	133,100	146,410
Total office supplies and Miscellaneous cost	270,000	297,000	326,700	359,370	395,307
Total Annual Operating Cost	2,826,000	3,108,600	3,419,460	3,761,406	4,137,547
Total Manual System Cost	2,837,500	3,120,100	3,430,960	3,772,906	4,149,047

Table 3.7. Five Years Accumulated Manual System Cost, Baht.

Year	Total Manual System Cost	Accumulated Cost
1	2,837,500	2,837,500
2	3,120,100	5,957,600
3	3,430,960	9,388,560
4	3,772,906	13,161,466
5	4,149,047	17,310,513
Total	17,310,513	-

(2) Cost of Proposed System

Table 3.8. Computerize System Cost Analysis, Baht.

Cost items	Years				
	1	2	3	4	5
Fixed Cost					
Hardware cost					
Computer Server	20,000	20,000	20,000	20,000	20,000
Workstation Cost 10 units	50,000	50,000	50,000	50,000	50,000
Dot matrix printer 1 unit	4,000	4,000	4,000	4,000	4,000
Laser Printer 4 units	8,000	8,000	8,000	8,000	8,000
Network Cost	10,000	10,000	10,000	10,000	10,000
UPS	4,200	4,200	4,200	4,200	4,200
Total Hardware Cost	96,200	96,200	96,200	96,200	96,200
Software Cost					
MS Windows XP	13,000	13,000	13,000	13,000	13,000
MS Office 2000 Professional	20,000	20,000	20,000	20,000	20,000
Total Software Cost	33,000	33,000	33,000	33,000	33,000
Implementation Cost					
Software Development Cost	150,000	-	-	-	-
Training Cost	20,000	-	-	-	-
Total Implementation Cost	170,000	-	-	-	-
Total Fixed Cost	299,200	129,200	129,200	129,200	129,200
Operating Cost					
Salary Cost					
Customer Department	40,000	44,000	48,400	53,240	58,564
Delivery Department	28,000	30,800	33,880	37,268	40,995
Research Department	80,000	88,000	96,800	106,480	117,128
Accounting Department	20,000	22,000	24,200	26,620	29,282
Managing Director	25,000	27,500	30,250	33,275	36,603
Maintenance Cost	20,000	22,000	24,200	26,620	29,282
Total Monthly Salary Cost	213,000	234,300	257,730	283,503	311,853
Total Annual Salary Cost	2,556,000	2,811,600	3,092,760	3,402,036	3,742,240

Table 3.8. Computerize System Cost Analysis, Baht. (Continue)

Office Supplies and Miscellaneous Cost	1	2	3	4	5
Stationary per annual	10,000	11,000	12,100	13,310	14,641
Paper per annual	10,000	11,000	12,100	13,310	14,641
Utility per annual	30,000	33,000	36,300	39,930	43,923
Miscellaneous	30,000	33,000	36,300	39,930	43,923
Total office supplies and Miscellaneous cost	80,000	88,000	96,800	106,480	117,128
Total Annual Operating Cost	2,636,000	2,899,600	3,189,560	3,508,516	3,859,368
Total Computer System Cost	2,935,200	3,028,800	3,318,760	3,637,716	3,988,568

Table 3.9. Five Years Accumulated Propose System Cost, Baht.

Year	Total Computer System Cost	Accumulated Cost
1	2,935,200	2,935,200
2	3,028,800	5,964,000
3	3,318,760	9,282,760
4	3,637,716	12,920,476
5	3,988,568	16,909,044
Total	16,909,044	-

Table 3.10. The Comparison of the System Cost, Baht.

Year	Accumulated Manual Cost	Accumulated Computer Cost
1	2,837,500	2,935,200
2	5,957,600	5,964,000
3	9,388,560	9,282,760
4	13,161,466	12,920,476
5	17,310,513	16,909,044

The payback analysis and candidate are shown the detail in Appendix G.

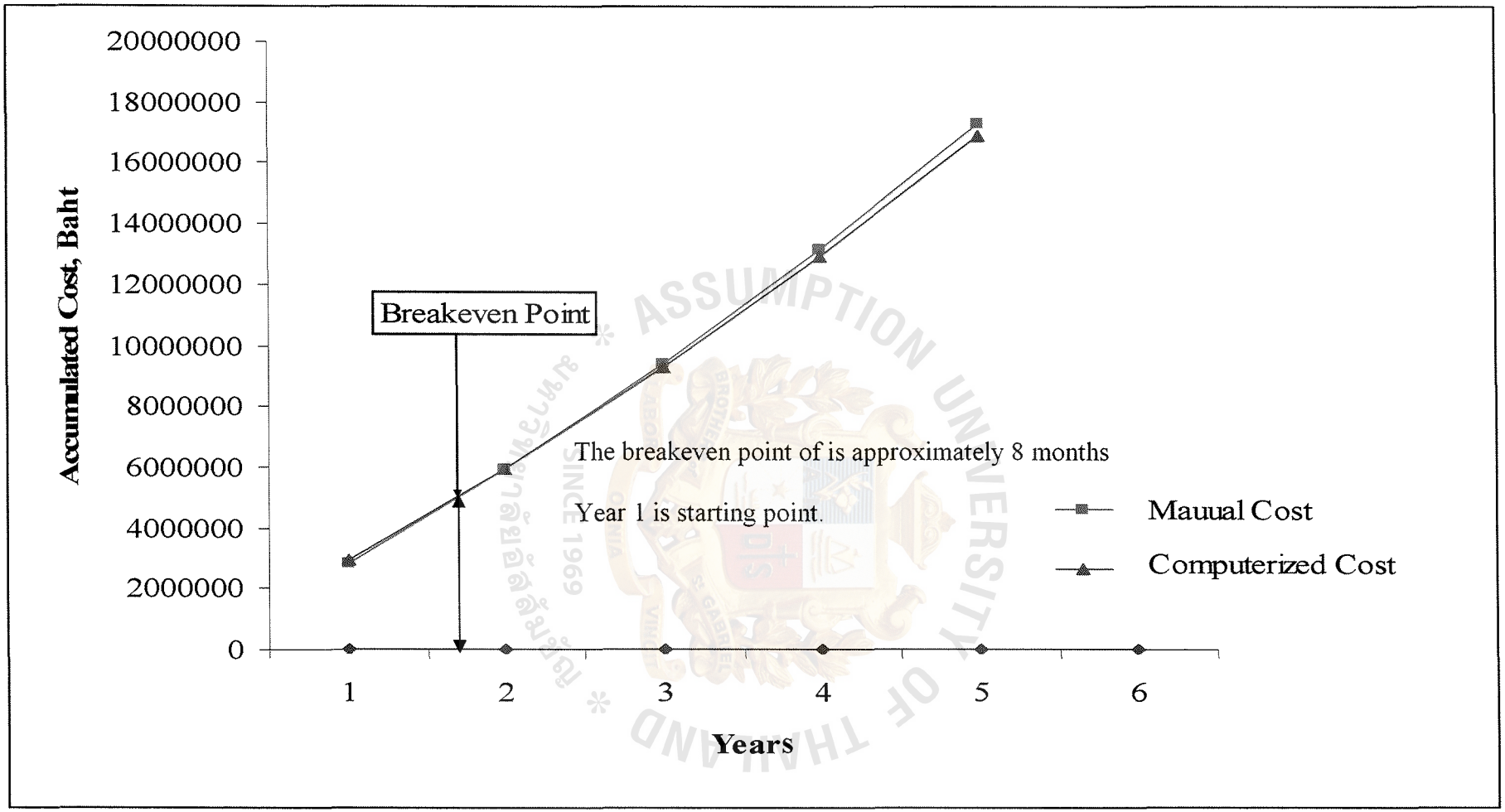


Figure 3.3. The Cost Comparison between Manual and Computerized System.

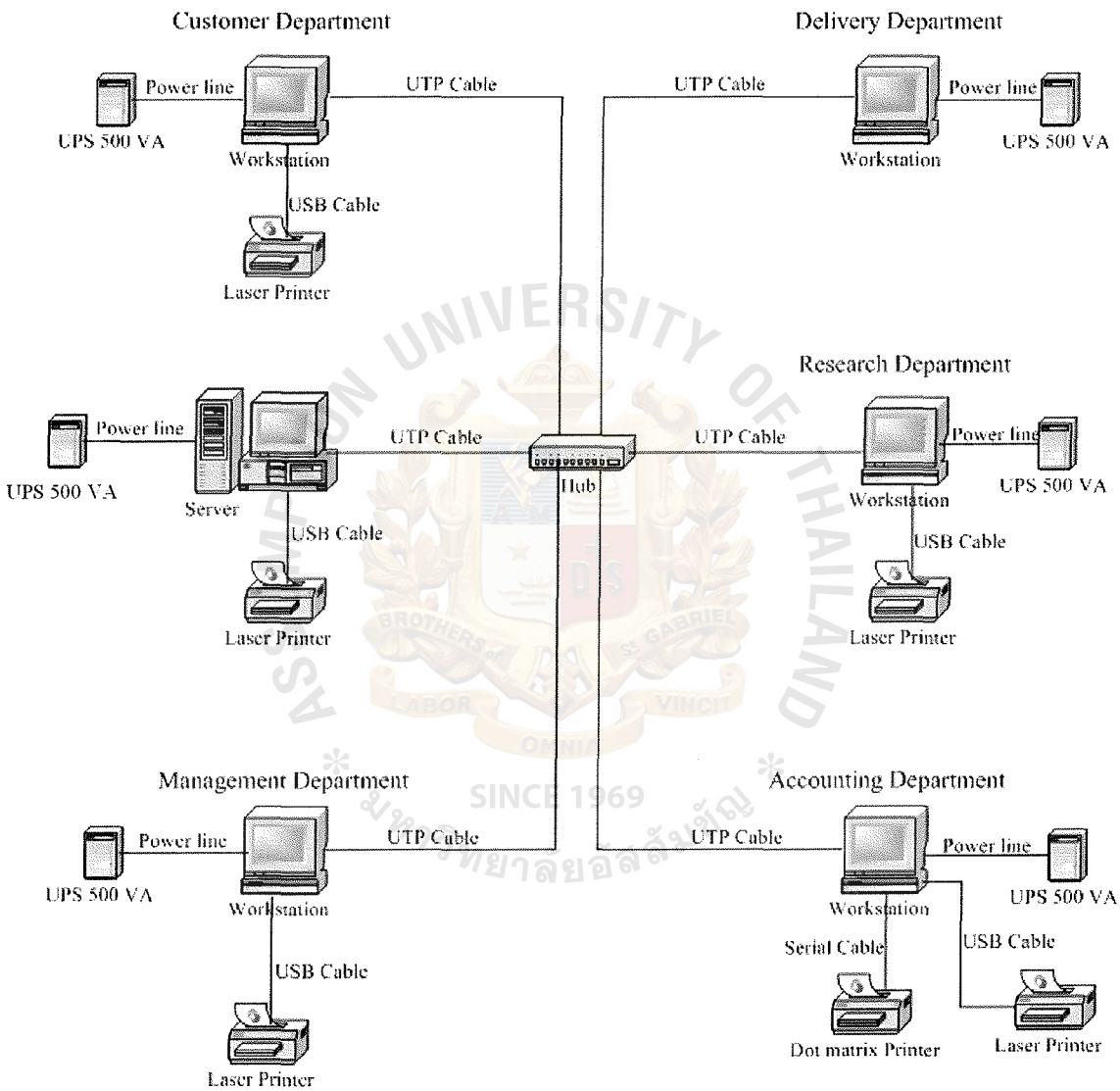


Figure 3.4. Network Configuration of Propose System

3.5 Security and Control

The information that is stored in the Sittipat Cosmetic Information System is very important for many departments in the organization. Therefore, the data in the database must always be available to be used by authorized persons when needed. A satisfactory level of shared ability must be achieved and unauthorized access must be prevented. The following security should be attained by the proposed system.

(1) The user's password must exist in the Sittipat Cosmetic Information System.

(2) There must be back up database and program in the form of diskettes or CD-ROM or DVD every month.

(3) The user profile needed to exist in the Sittipat Cosmetic Information System to classify the group of users who can read, insert, edit and execute the data in the database.

(4) The company must set the rule of using the computer for staffs to protect physical components as well as computer system.

(a) Do not leave from workstation without logging off the screen

(b) Do not install any software on the workstation

(c) Food and drink are not allow near workstation

(d) Proper shutdown before end of task

(e) Contact IT specialist when problems occur in workstation

(f) Check virus in all medias before using workstation

(g) Every workstation must be connected with UPS

(h) Do not fix workstation by yourself

(i) Keep the media which contain company data in safe place

(j) All workstations and server must check virus every week

IV. PROJECT IMPLEMENTATION

4.1 Overview of Project Implementation

System Implementation is the conversion processes from the current manual system to the new computerized information system. The final design should be evaluated first by the users and management teams to make sure that the new computerized system can meet the requirements and objectives, then the other remaining processes will be performed

It is expected that the system implementation would take approximately six weeks. The duration may vary depending on the readiness of the staffs to use the new system. The processes of System Implementation are:

(1) Software development

(2) Hardware Installation

(3) Personal Training

(4) Test Plan

(5) Conversion

(6) Documentation

4.2 Software Development

Using Microsoft Access as DBMS develops the Sale and Billing Information System. The computerized system is developed on a user friendly base and the capability in marketing reports. The system allows user to add, edit and delete the data and also search for desired data. In order to generate reports, the system will use many tables in database file and make the calculation in the required field based on user and managements.

4.3 Hardware Installation

In order to establish the computerized system, the company requires new File Server as shown in the Cost/Benefit Analysis section in Chapter 3. The workstations need to be installed with LAN card so they can work in the network system in the proposed system. The additional hardware required is shown in Chapter 3 and a Hub.

4.4 Personal Training

User training course is an important process in system implementation. The objective of training course is to make users understand, be familiar and able to use the program correctly. The training course should include computer concepts, functions of hardware and software, functions of the proposed system and how to use the system properly and efficiently. Users should be given the system manual, class lectures about the procedure and hands on experience on using new equipment. Furthermore, the programmer or system analyst should supervise users when initially using system.

4.5 Test Plan

After the program has been designed and installed, module testing, program testing and system testing are required to ensure that the new system are free from errors and can work well.

Module testing would help to check errors in program module. It can detect errors in coding and errors in logic. After finishing all module testing, program testing is used to check the program to verify the way the system works and to check whether each module can work together or not. System testing is checked whether the proposed system can share data or work with the other manual system properly. When completed all testing, the testing document plans and testing results should be made. So when the company has to do the testing again in the future, programmers can use these plans and results to do the testing again. Moreover, Security and Recovery testing is tested to

ensure that the system can protect unauthorized users from access into the system. If failure happens to the database, the system should be able to recover those data.

The effective testing of the program dose not guarantee system reliability. Therefore, the test case should include the input Validation, Functionality, and Access Control

4.6 Conversion

Conversion is the process of changing from a manual system to a new proposed system. The conversion process is setup based on the replacing concept. The users have to key the data into the database, and then install the program for the system.

4.7 Documentation

Documentation of the proposed system is separated into two documents. First is the user guide, which describes how to access and use the program, how to correct the problems and how to use interface screens. The second is the flow of the system and data dictionary. Both documents can help the users whenever they need to face the problem when using the program and also can help programmer to develop and maintain the system.

V. CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

Studying and analyzing the existing system, let us find many problems and needs to improve by replacing with the proposed system. The company has to spend a lot of money in the initially computerized system. But from cost analysis of the computerized system which is determined by using payback method and the break-even point between the manual system and the computerized system, at the beginning, the computerized system costs are higher than the manual system but later in both systems it will be the same cost and then the accumulating cost of computerized system will be lower.

The new system also can increase the security and control of the information in the system which makes the information more accurate, reliable and improve customer satisfaction. The new system uses User Identification to ensure that only authorized users can enter into the system and access to the information.

Moreover, the new system can make the high performance report. It can help the company know which product is the best seller or worth seller so the company can predict what is the product it can produce in a large number or produce less than in the past or eliminate some non profit products. It has higher efficiency than the manual system, reduce processes work time, decrease human hiring cost.

Table 5.1. The degree of achievement of the new proposed system

Process	Existing System	Proposed System
Customer Information Process	15 minutes	1 minutes
Order Process	5 minutes	1 minutes
Order checking Process	30 minutes	3 minutes
Billing Process	2 hours	20 minutes

Explanation degree of achievement of the new proposed system:

(1) Customer Information Process

The existing system spends 15 minutes to insert new customer information. The new system customer service can input customer id, customer information then click save to finish this process.

(2) Order Process

The customer just only tell customer id then they can tell product code to order the product. The customer service can work immediately.

(3) Order checking Process

To check the product from customer order. The customer service can check by input product code. It shows whether status of the product is available or not available and finishes order checking in a short time.

(4) Payment Checking Process

This process does not exist in the existing system, but management section is required to add this function to the proposed system. It is an important function to check daily income.

(5) Billing Process

The existing system uses a lot of time to generate invoices of each customer manually so that the company can avoid human error. But in the proposed system, the seller can compare the customer order file the delivery slip and generated invoice

5.2 Recommendations

From the result of analyze of work flow, cost analysis, problem of the existing system and the proposed system, working process time, it is concluded that the company should implement the new system to replace the manual system to increase work efficiency and profitability.

The data backup and recovery plan is very important because it can crash by some accidents like natural disaster or other external accidents. The important data can be recovered after that situation.

In the future, the on-line product ordering or product checking is an attractive way to expand the company business, because the new products will be produced each half year. It provides comfortability to the customer in terms of checking and ordering the company products.

APPENDIX A

DATABASE DESIGN

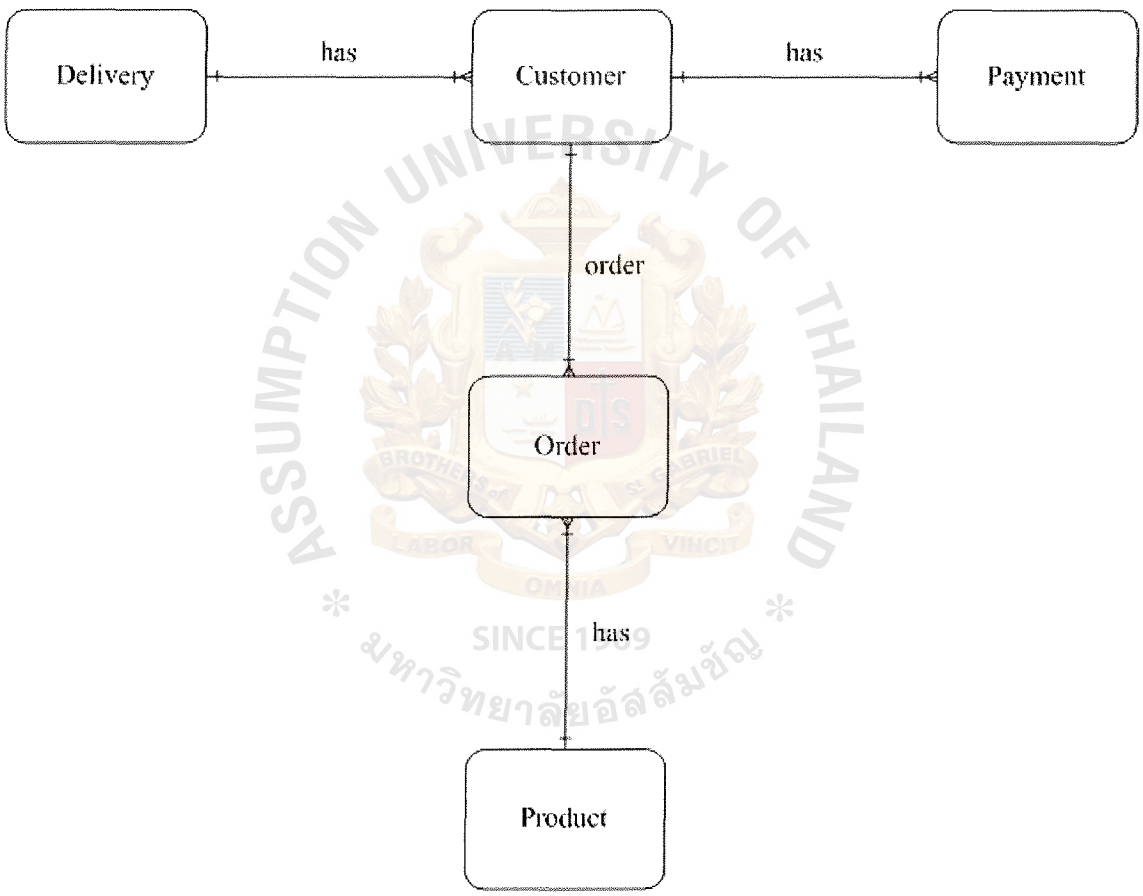


Figure A.1. Context Level of Entity Relationship Diagram of Sittipat Cosmetic Company Information System

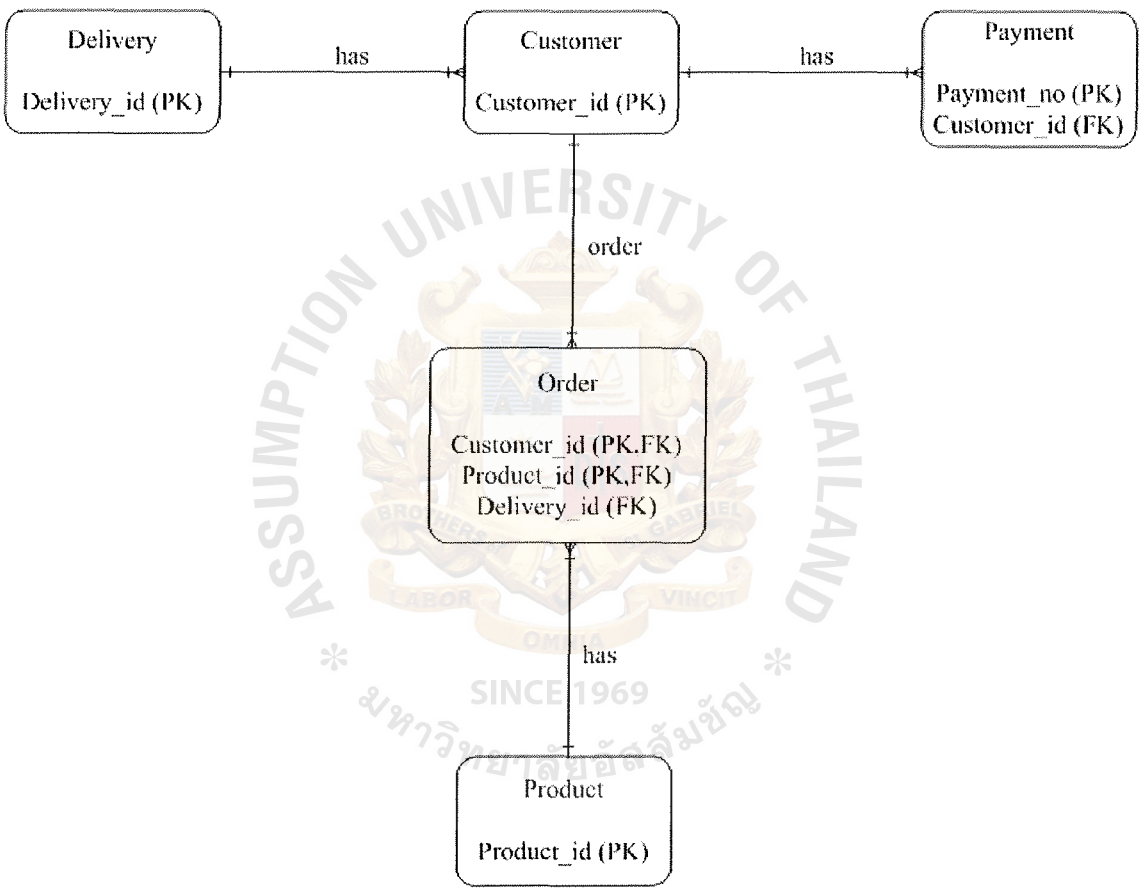


Figure A.2. Key-base Attributed Entity Relationship Diagram of Sittipat Cosmetic Company Information System

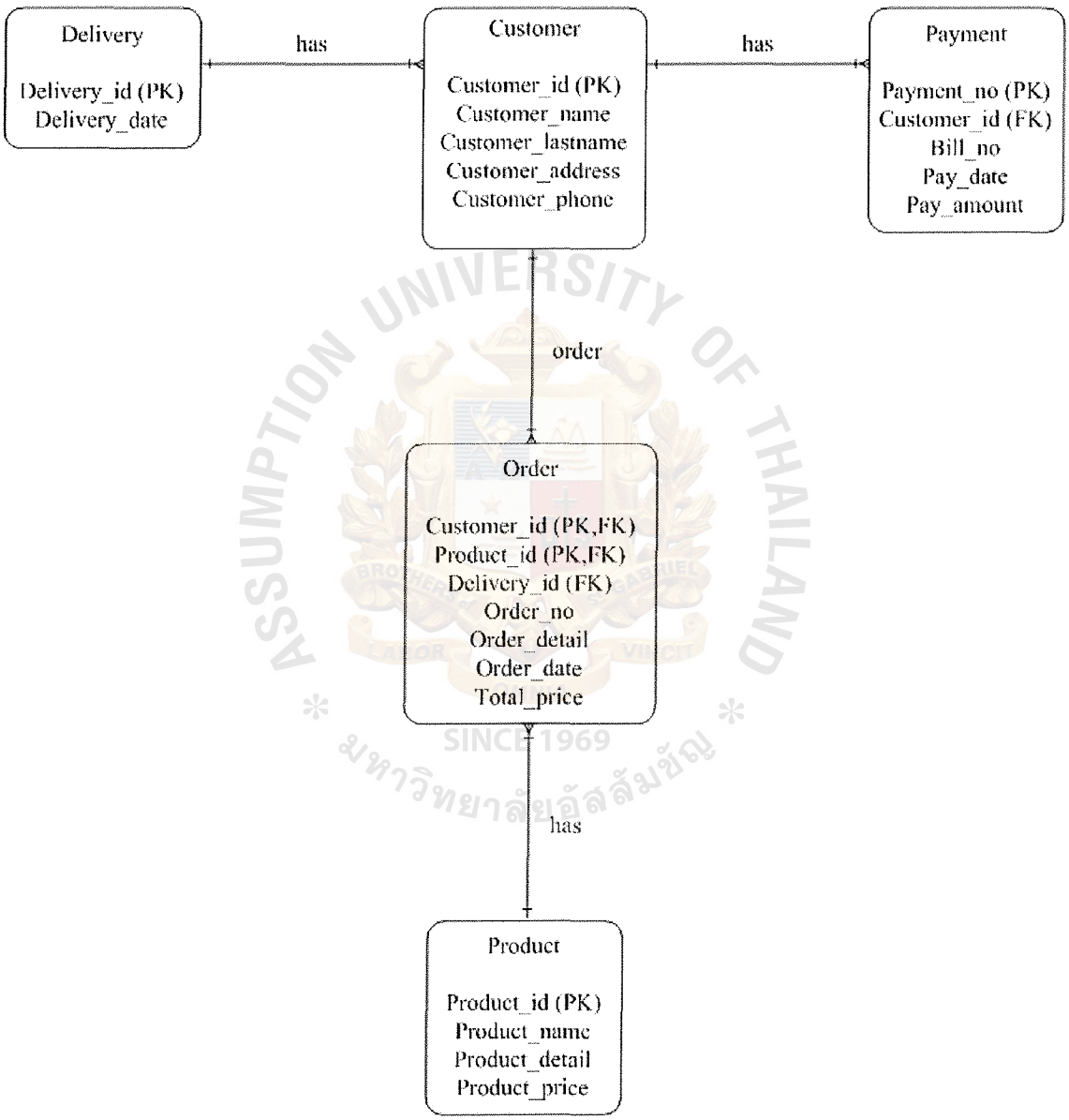


Figure A.3. Fully Attributed Entity Relationship Diagram of Sittipat Cosmetic Company Information System

Table A.1. Structure of Customer table

Name	Storage Type	Length
Customer_id(PK)	Integer 4	4
Customer_name	Char	30
Customer_lastname	Char	30
Customer_address	Interger 4	50
Customer_phone	Interger	15

Table A.2. Structure of Delivery table

Name	Storage Type	Length
Delivery_id(PK)	Interger	4
Delivery date	Interger	30

Table A.3. Structure of Payment table

Name	Storage Type	Length
Payment_no(PK)	Integer	4
Customer_id(FK)	Integer	4
Bill_no	Integer	4
Pay_date	Integer	30
Pay_amount	Integer	15

Table A.4. Structure of Product table

Name	Storage Type	Length
Product_id(PK)	Integer	4
Product_name	Char	30
Product_detail	Char	50
Product_price	Integer	15

Table A.5. Structure of Order table

Name	Storage Type	Length
Customer_id(PK,FK)	Integer	4
Product_id(PK,FK)	Integer	4
Delivery_id(FK)	Interger	4
Order_no	Interger	4
Order_detail	Char	50
Order_date	Interger	30
Total_price	Integer	15

APPENDIX B

DATA DICTIONARY

Table B.1. Data Dictionary of Customer Table

Field Name	Meaning
Customer_id(PK)	Customer Identification number.
Customer_name	Name of customer.
Customer_lastname	Lastname of customer.
Customer_address	Address of customer
Customer_phone	Phone number of customer.

Table B.2. Data Dictionary of Delivery Table

Field Name	Meaning
Delivery_id(PK)	Delivery Identification number.
Delivery date	Date of deliveried product to customer.

Table B.3. Data Dictionary of Payment Table

Field Name	Meaning
Payment_no(PK)	Payment Identification number
Customer_id(FK)	Customer Identification number.
Bill_no	Billing Identification number.
Pay_date	Date of billing payment.
Pay_amount	Total money that customer pay.

Table B.4. Data Dictionary of Product Table

Field Name	Meaning
Product_id(PK)	Product Identification number.
Product_name	Name of the product.
Product_detail	Product description.
Product_price	Price of product.

Table B.5. Data Dictionary of Order Table

Field Name	Meaning
Customer_id(PK,FK)	Customer Identification number.
Product_id(PK,FK)	Product Identification number.
Delivery_id(FK)	Delivery Identification number.
Order_no	Order Identification number.
Order_detail	Detail of customer order.
Order_date	Date of customer order.
Total_price	Total money that customer must be pay.

APPENDIX C

DATA FLOW DIAGRAM

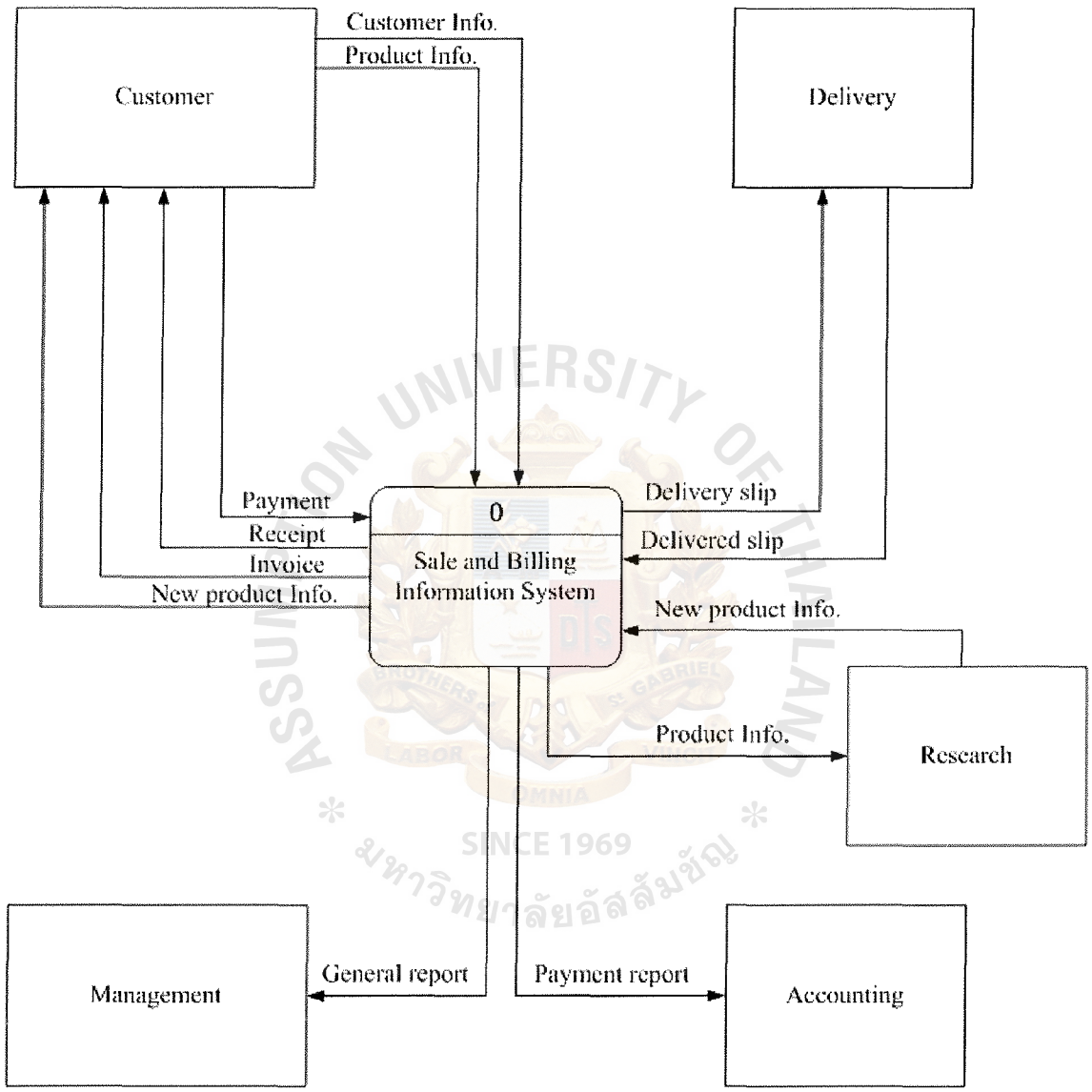


Figure C.1. Context Data Flow Diagram of the Proposed Sittipat Cosmetic Company Information System.

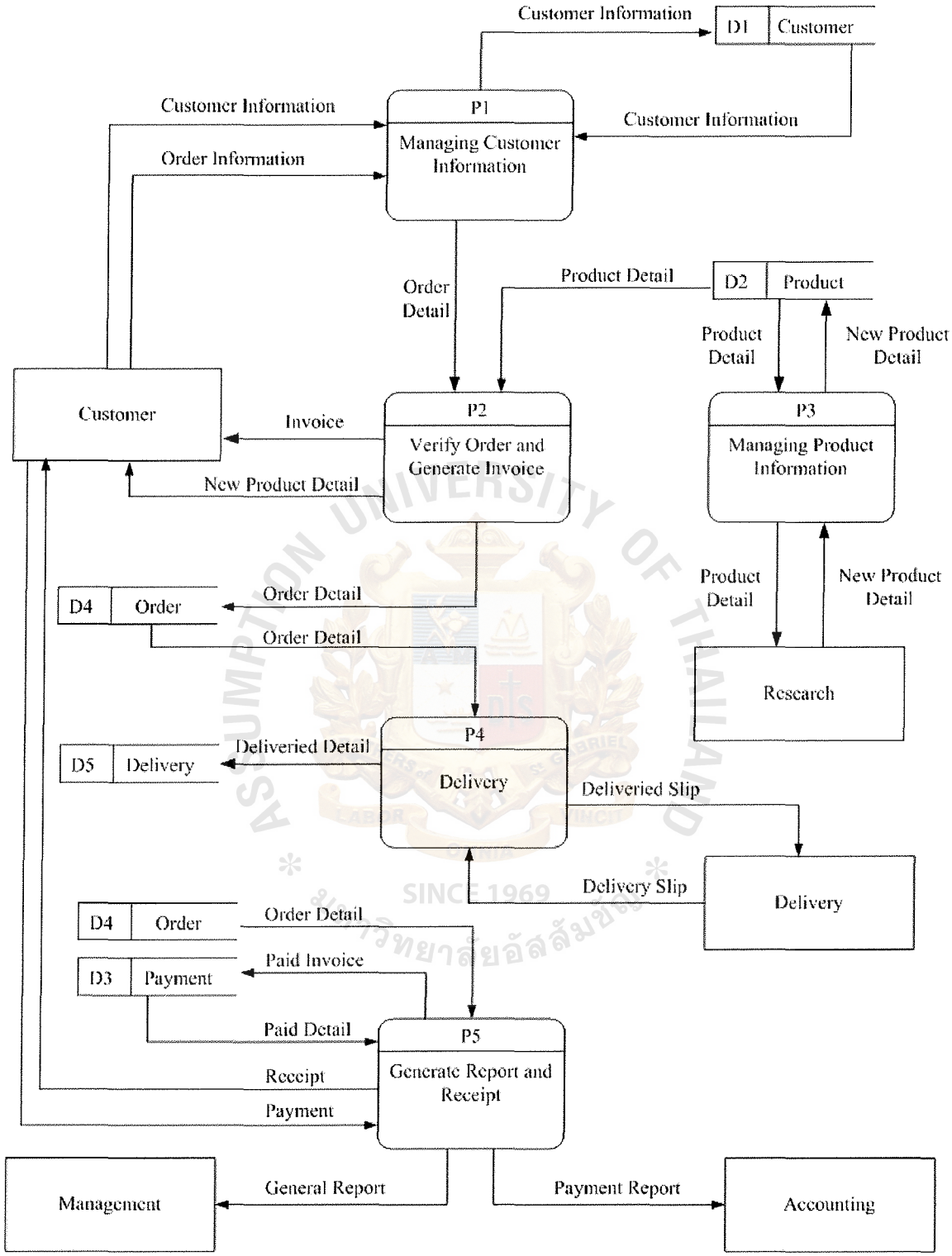


Figure C.2. Level 0 Data Flow Diagram of the Proposed Sittipat Cosmetic Company Information System.

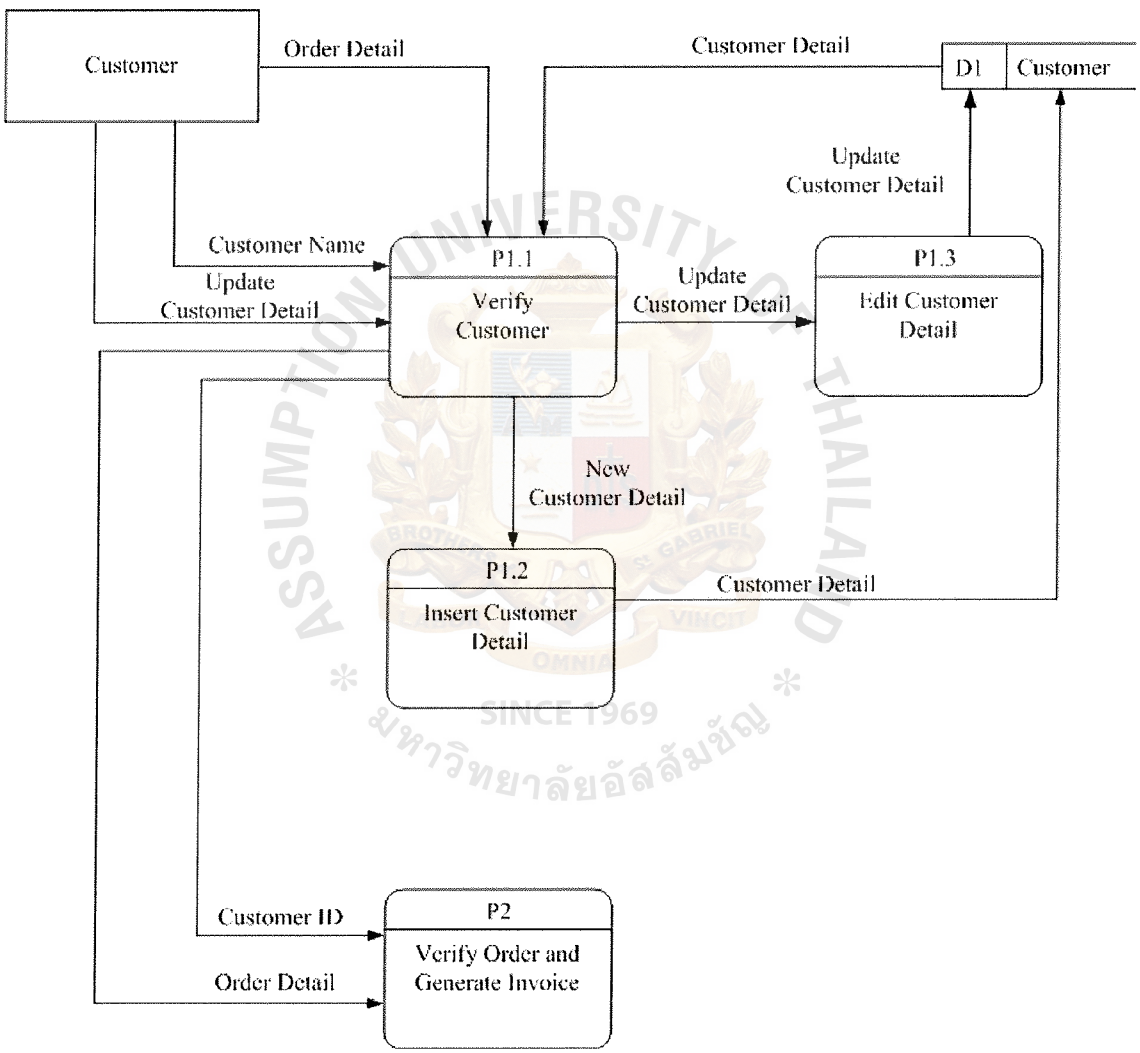


Figure C.3. Level 1 Data Flow Diagram of Process Managing Customer Information.

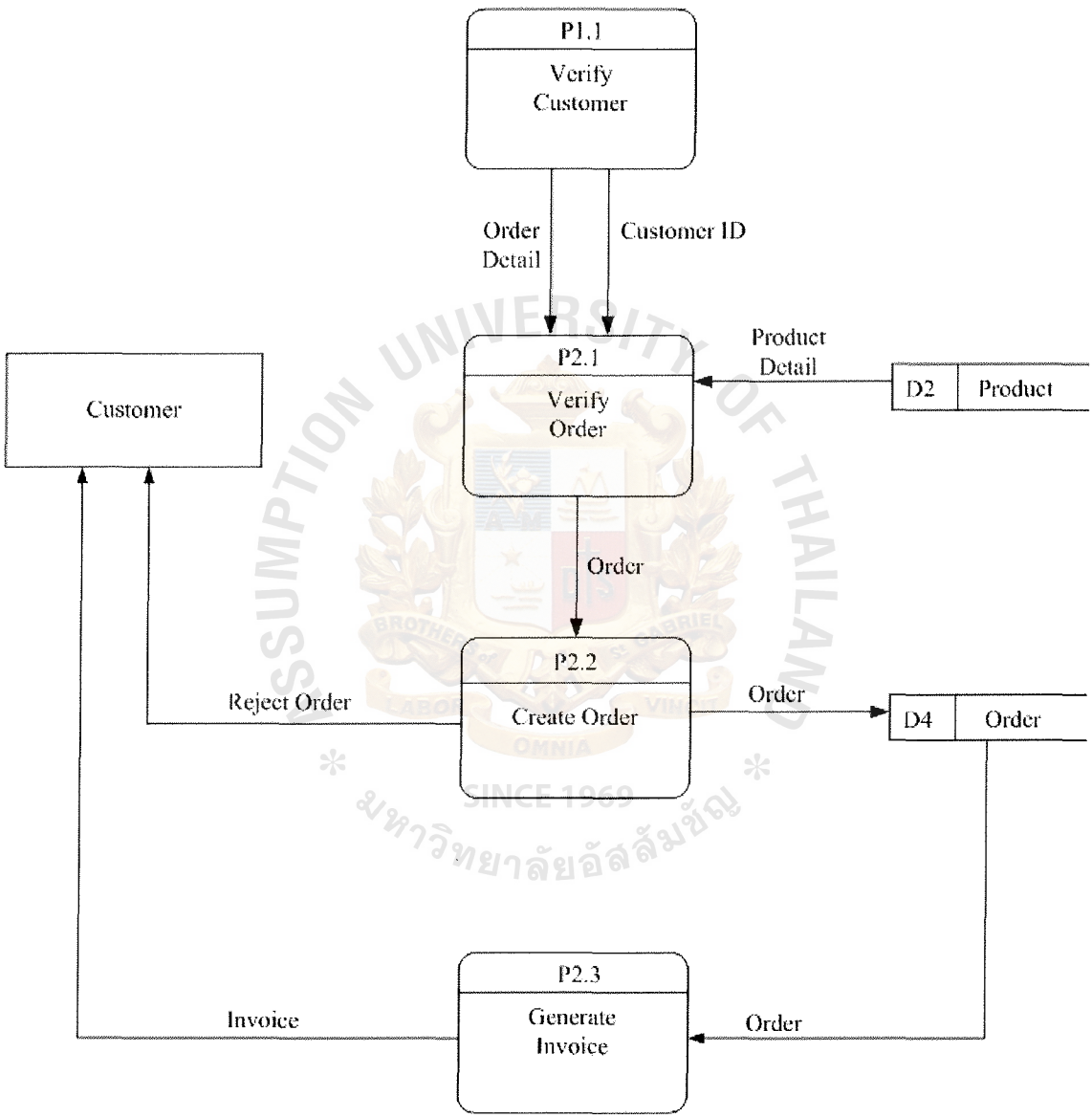


Figure C.4. Level 1 Data Flow Diagram of Process Verify Order and Generate Invoice.

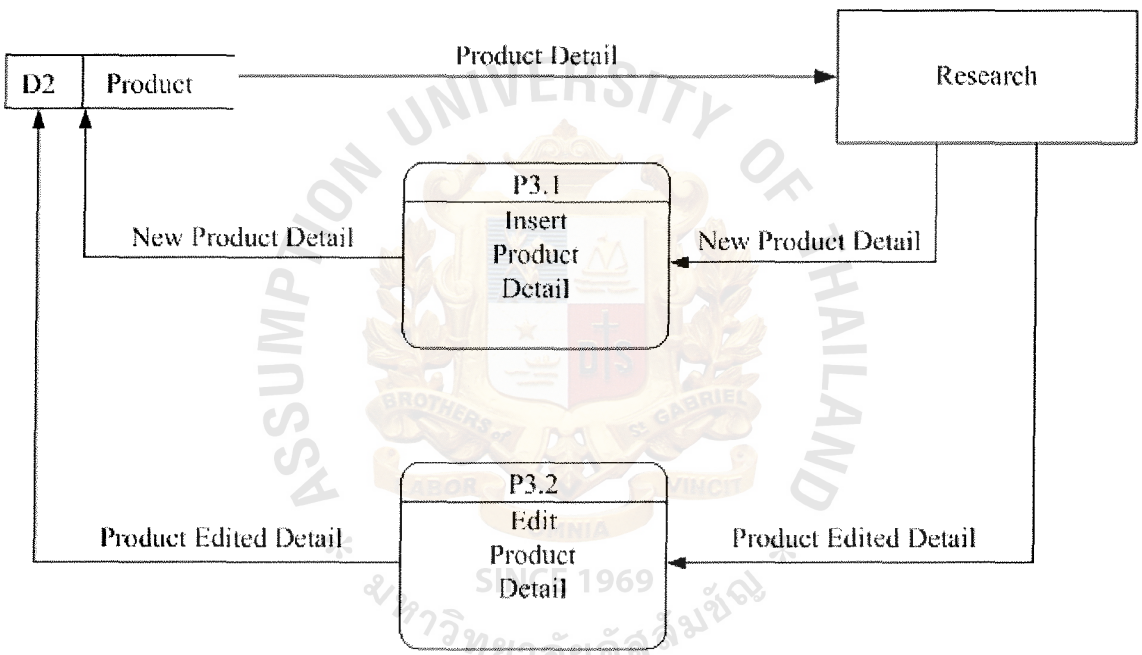


Figure C.5. Level 1 Data Flow Diagram of Process Managing Product Information.

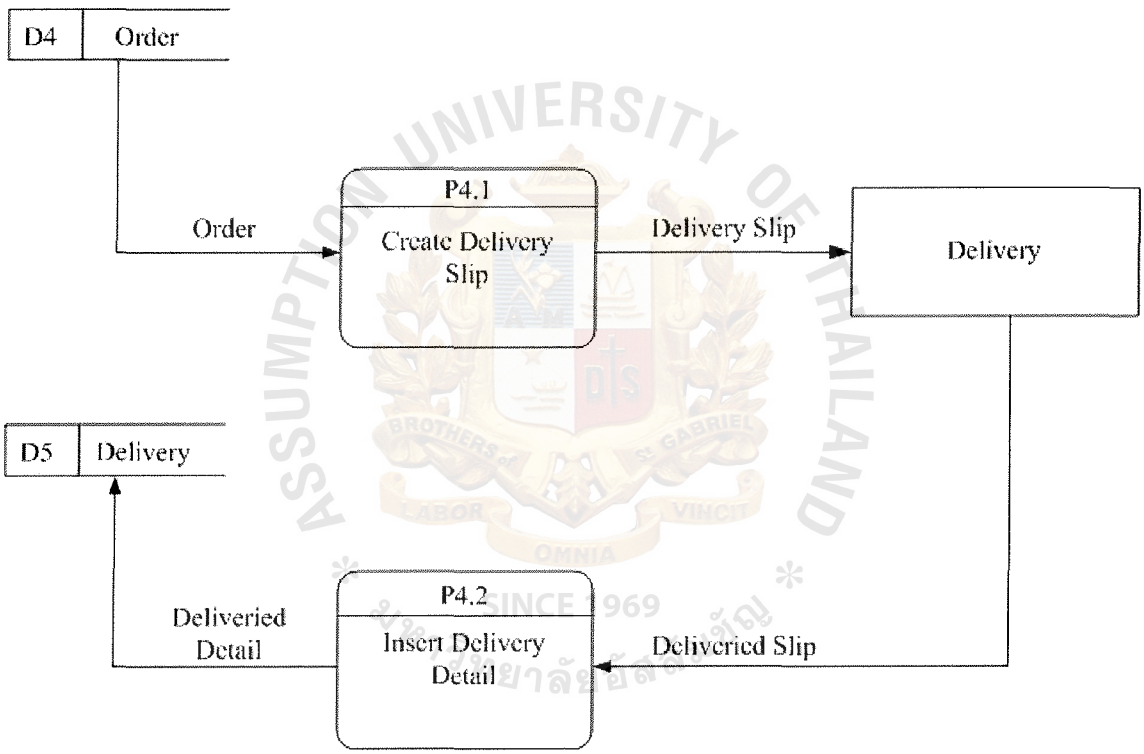


Figure C.6. Level 1 Data Flow Diagram of Process Delivery.

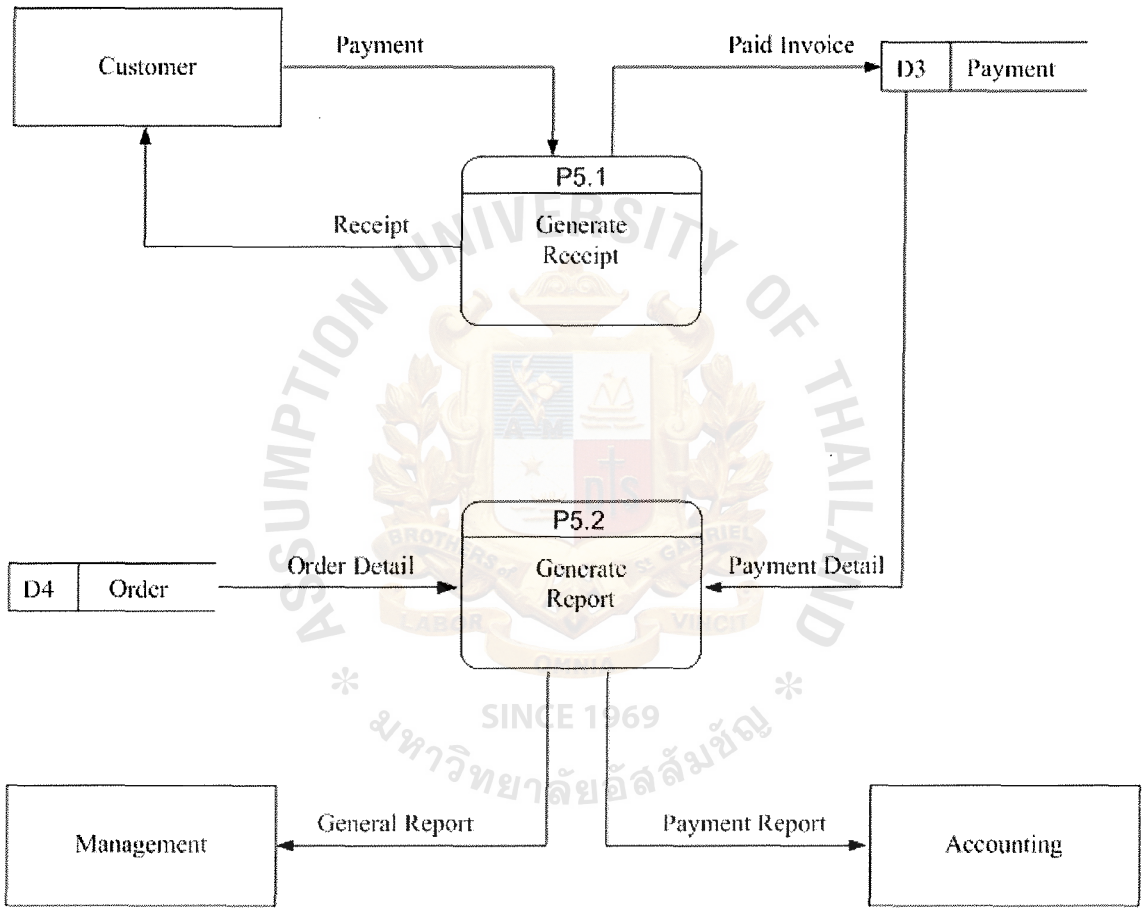


Figure C.7. Level 1 Data Flow Diagram of Process Generate Report and Receipt.

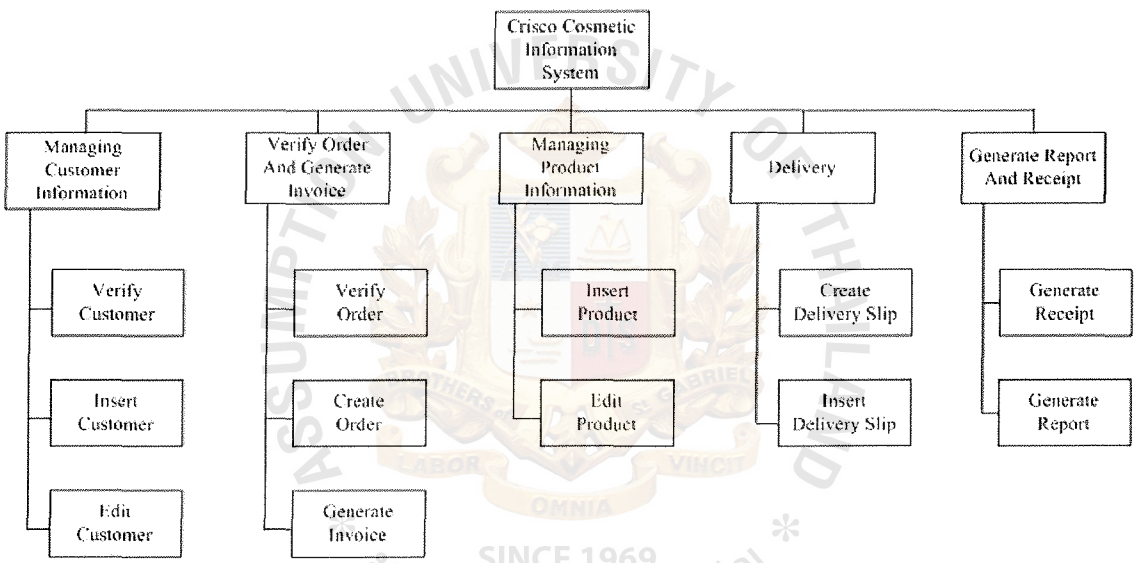


Figure C.8. A Function Decomposition Diagram of the Proposed Sittipat Cosmetic Company Information System

APPENDIX D

PROCESS SPECIFICATION

Table D.1. Process Specification of Process 1.1

Data Item	Description
Process Name:	Verify Customer
Data In:	1. Customer name 2. New Customer detail
Data Out:	1. Customer detail 2. Order detail
Process:	1. Check customer detail
Attachment:	1. Customer Department

Table D.2. Process Specification of Process 1.2

Data Item	Description
Process Name:	Insert Customer Detail
Data In:	1. New Customer deatil
Data Out:	1. Customer detail
Process:	1. Insert New Customer detail
Attachment:	1. Data Store D1

Table D.3. Process Specification of Process 1.3

Data Item	Description
Process Name:	Edit Customer Detail
Data In:	1. Update Customer detail
Data Out:	1. Customer detail
Process:	1. Edit Customer detail
Attachment:	1. Data Store D1

Table D.4. Process Specification of Process 2.1

Data Item	Description
Process Name:	Verify Order
Data In:	1. Customer ID 2. Order detail
Data Out:	1. Order 2. Reject order
Process:	1. Check Product detail
Attachment:	1. Customer Department

Table D.5. Process Specification of Process 2.2

Data Item	Description
Process Name:	Create Order
Data In:	1. Order detail
Data Out:	1. Order
Process:	1. Generate order
Attachment:	1. Data Store D4

Table D.6. Process Specification of Process 2.3

Data Item	Description
Process Name:	Generate Invoice
Data In:	1. Order detail
Data Out:	1. Invoice
Process:	1.Generate Invoice
Attachment:	1. Customer Department

Table D.7. Process Specification of Process 3.1

Data Item	Description
Process Name:	Insert Product detail
Data In:	1. New Product detail 2. Product detail
Data Out:	1. New product detail
Process:	1. Check Product detail 2. Insert Product detail
Attachment:	1. Data Store D2

Table D.8. Process Specification of Process 3.2

Data Item	Description
Process Name:	Edit product detail
Data In:	1. Product detail
Data Out:	1. Product Edit detail
Process:	1. Check Product detail 2. Edit Product detail
Attachment:	1. Data Store D2

Table D.9. Process Specification of Process 4.1

Data Item	Description
Process Name:	Create Delivery Slip
Data In:	1. Order detail
Data Out:	1. Delivery Slip
Process:	1. Check Order detail 2. Generate Delivery Slip
Attachment:	Delivery Department

Table D.10. Process Specification of Process 4.2

Data Item	Description
Process Name:	Insert Delivery detail
Data In:	1. Delivery detail
Data Out:	2. Delivered detail
Process:	1. Insert delivery detail
Attachment:	1. Data Store D5

Table D.11. Process Specification of Process 5.1

Data Item	Description
Process Name:	Generate Receipt
Data In:	1. Payment detail
Data Out:	1. Receipt 2. Paid Invoice
Process:	1. Check Payment detail 2. Generate Receipt
Attachment:	1. Customer Department 2. Data Store D3

Table D.12. Process Specification of Process 5.2

Data Item	Description
Process Name:	Generate Report
Data In:	1. Payment detail 2. Order detail
Data Out:	1. General Report 2. Payment Report
Process:	1. Check Payment detail 2. Check Order detail 3. Generate General Report 4. Generate Payment Report
Attachment:	1. Management Department 2. Accounting Department

APPENDIX E

INTERFACE DESIGN

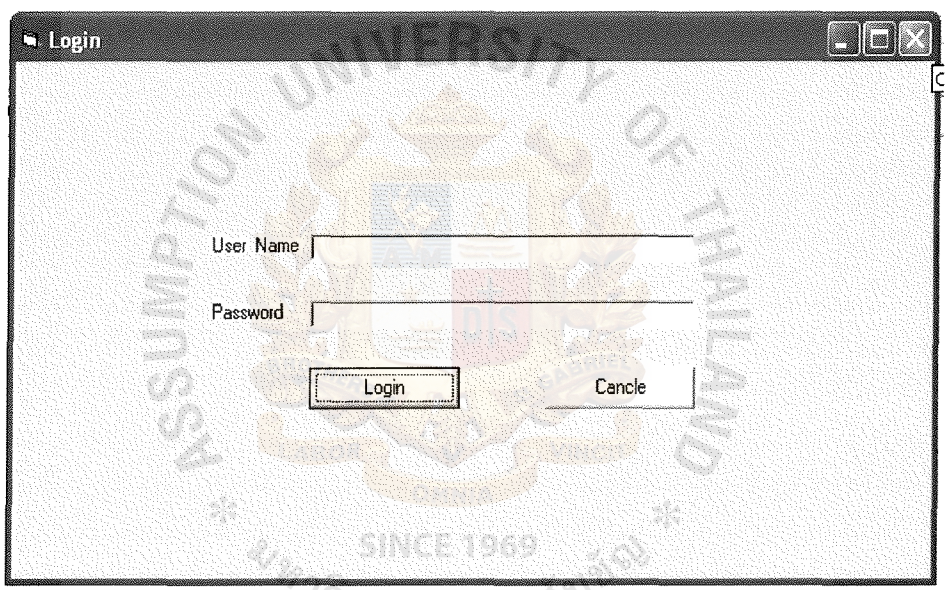


Figure E.1. Login Screen Form.

Figure E.2. Main Menu Form

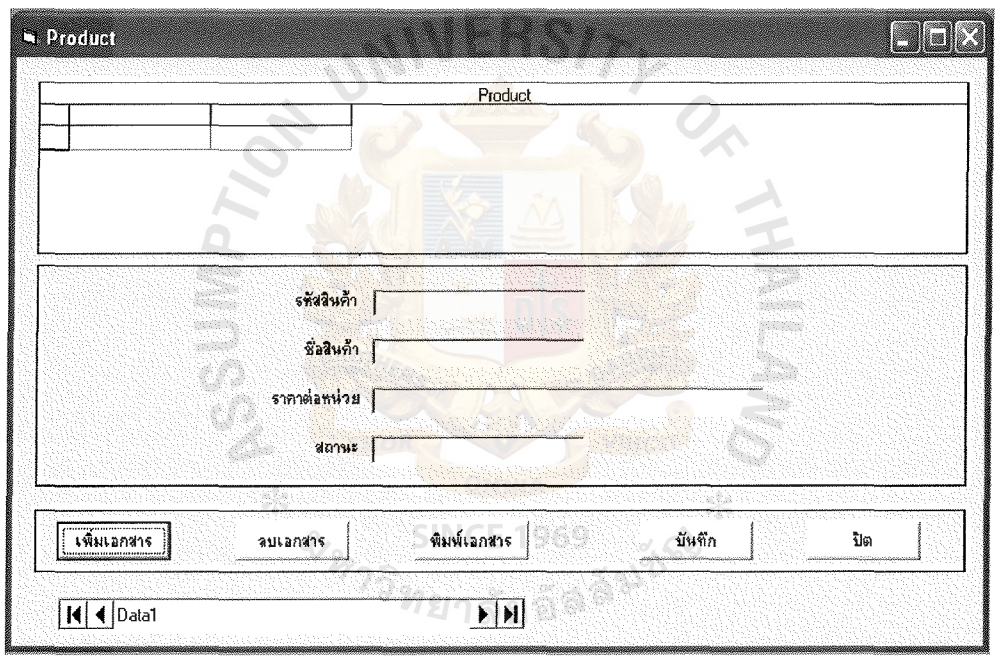


Figure E.3. Product Information Form

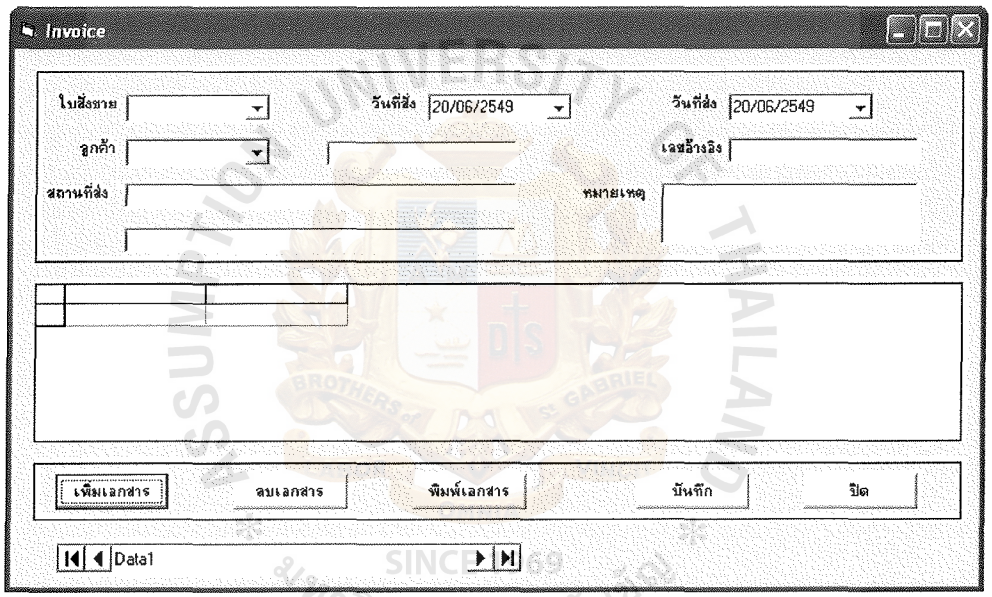


Figure E.4. Invoice Form

APPENDIX F

REPORT DESIGN

Crisco Cosmetic Co., Ltd.

สรุปรายการขาย

ประจำวันที่ 20 มิถุนายน 2549

รหัส/ชื่อลูกค้า	รหัส/ชื่อสินค้า	จำนวน	ราคา	เป็นเงิน
P0001 นายสิทธิพัฒน์ เพชรวัตร	A0001 โลชั่นผสมวิตามิน อี สีฟ้า	1	59	59
	A0005 BYS ซุปเปอร์พลัมลิปสติค เบอร์ 1	1	79	79
	A0012 BYS ซุปเปอร์ไวท์พาวเดอร์ เบอร์ 2	1	109	109
P0002 นางสาว อักษร เพชรวัตร	A0003 BYS อายแชโดว์ เบอร์ 1	1	89	89
	A0020 ชุดแปรง 7 ชิ้น	1	139	139
		รวมทั้งสิ้น		475

Figure F.1. Delivery Report

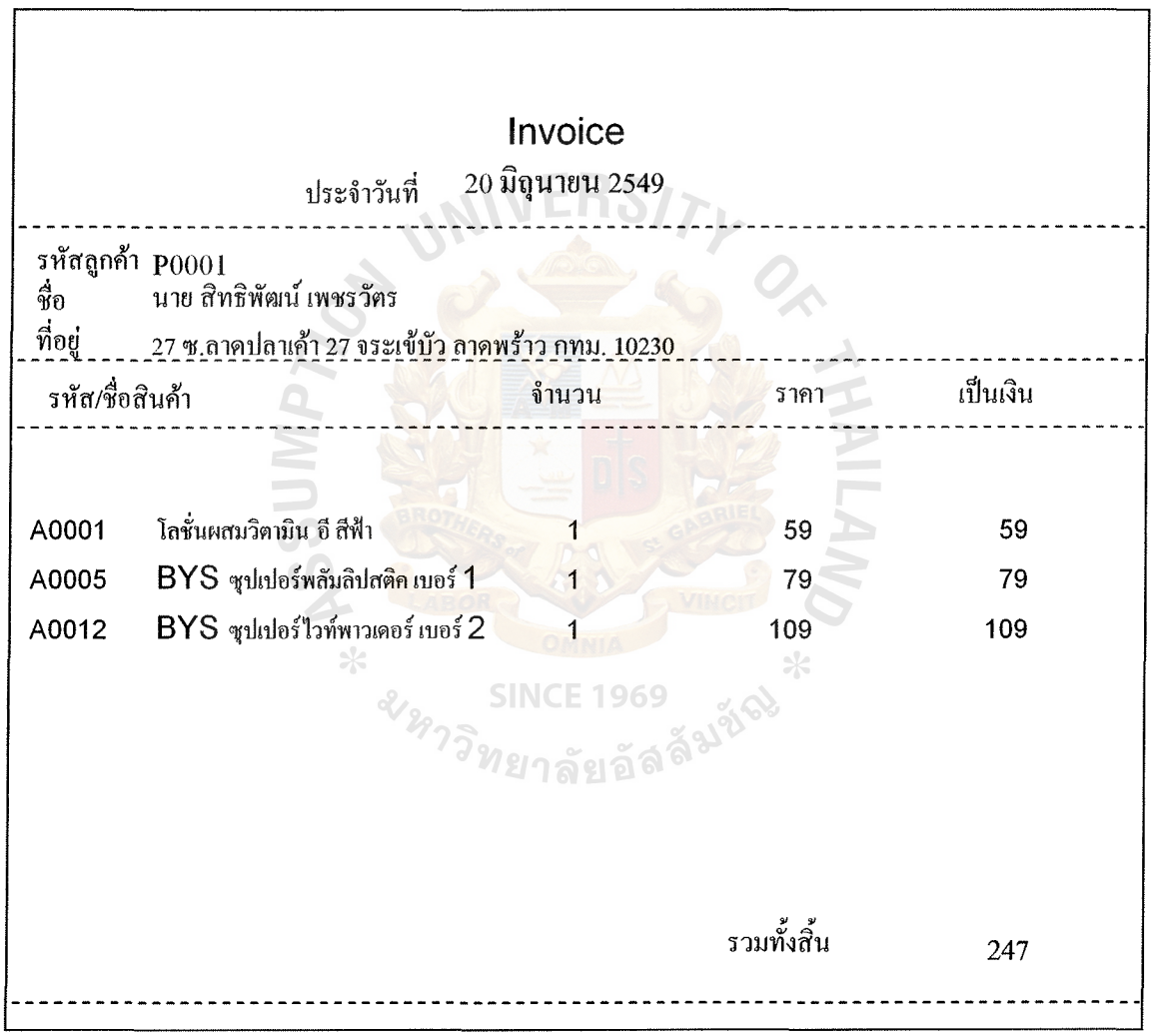
Crisco Cosmetic Co., Ltd.

รายงานยอดขายประจำเดือน

ประจำวันที่ 1 มิถุนายน 2549 ถึง 30 มิถุนายน 2549

รหัส/ชื่อลูกค้า	เป็นเงิน
P0001 นายสิทธิพัฒน์ เพชรวัตร	247
P0002 นางสาว อักษร เพชรวัตร	228
รวมทั้งสิ้น	475

Figure F.2. Sale Volume Report



Invoice

ประจำวันที่ 20 มิถุนายน 2549

รหัสลูกค้า P0001
ชื่อ นาย สิทธิพัฒน์ เพชรวัตร
ที่อยู่ 27 ซ.ลาดปลาเค้า 27 จระเข้บัว ลาดพร้าว กทม. 10230

รหัส/ชื่อสินค้า		จำนวน	ราคา	เป็นเงิน
A0001	โลชั่นผสมวิตามิน อี สีฟ้า	1	59	59
A0005	BYS ซุปเปอร์พลัมลิปสติค เบอร์ 1	1	79	79
A0012	BYS ซุปเปอร์ไวท์พาวเดอร์ เบอร์ 2	1	109	109
			รวมทั้งสิ้น	247

Figure F.3. Invoice

APPENDIX G

ALTERNATIVE CANDIDATE SOLUTIONS

Table G.1. Candidate Matrix.

Characteristics	Candidate 1	Candidate 2	Candidate 3
Portion of system computerized: Brief description of the portions of the system that would be computerized in the candidate.	LAN Communication Include One Server	Same as candidate 1.	Same as candidate 1.
Benefits: Brief description of the business benefits that would be realized in the candidate.	To gain better company performance	Same as candidate 1.	Same as candidate 1.
Servers and Workstations: A description of the server and the workstations needed to support this candidate.	Server Pentium 4 2.66 GHz PC Pentium Celeron 2.53 GHz	Server Pentium 4 3.0 GHz PC Pentium 4 2.0 GHz	Server AMD AthlonXP 2300+ 2.0 GHz PC Duron 1.8 GHz
Application software: Description of the software to be purchased, built, accessed, or some combination of these techniques.	Microsoft Windows XP Microsoft Visual Basic Microsoft Access 2000	Microsoft Windows 2000 Server Microsoft Visual Basic Microsoft Access 2000	Linux Oracle 8.0 Paradox 7
Method of data processing: Generally some combination of online. Batch, deferred batch, remote batch, and real time.	Client/Server	Client/Serve.	Client/Server
Output devices and implications: A description of output devices that would be used, special output requirements (e.g. Network, preprinted form, etc.) and output considerations (timing constraints).	Display monitor, Dot matrix printer, and Laser printer.	Same as candidate 1.	Same as candidate 1.

Table G.1. Candidate Systems Matrix (Continued).

Characteristics	Candidate 1	Candidate 2	Candidate 3
Input devices and implications: A description of input methods to be used input devices (e.g. Keyboard, mouse, etc.), special input requirements (e.g. new or revised forms from which data would be input), and input considerations (e.g. timing of actual inputs).	Keyboard and mouse.	Same as candidate 1.	Same as candidate 1.
Storage devices and implications: Brief description of what data would be stored, what data would be accessed from existing stores, what storage media would be used, how much storage capacity would be needed, and how data would be organized.	MS Access 2000 with 80 GB storage capacities.	MS Access 2000 with 80 GB Storage capacities.	Oracle 8 with 80 GB Storage capacities.
Training: Description of the alternative way of training and preparing our personnel for the new system.	To train actual Employees.	To train new employee who have some knowledge.	To train actual Employees.
Technical Staff: Description of the alternative way for the company to hire the people who have knowledge about the new technology.	To hire the new employees who have the knowledge.	Actual employee combined with new employees.	To hire the new employees who have the knowledge.

There are the difference among those three alternative candidates. Not only the characteristics, but also the processing efficiency, flexibility, end-user friendliness and programming complexity should be considered. The capacity of each alternative can determine from Table G.2.

Table G.2. Comparison of Alternative Candidates.

Alternative	Processing Efficiency	Flexibility	End-User Friendliness	Programming Complexity
Candidate 1	Medium-High	High	High	Low
Candidate 2	High	High	High	Low
Candidate 3	Low-Moderate	Low	Low	High

G.2. Explanation of the degree of capacity

(1) Processing Efficiency

Candidate 2 use better computer than Candidate 1 and Candidate 3. So the processing efficiency is higher than others. However, Candidate 1 use the similar system so the efficiency is similar to Candidate 2.

(2) Flexibility

The flexibility to expand the porting of the system supporting other operation can be done by all candidate. However, Candidate 3 use Linux software which is inflexible compare with others.

(3) End-User Friendliness

The interface of candidate1 and Candidate 2 generating from Visual Basic which is more user friendly than Candidate 3.

(4) Programming Complexity

The programming of candidate 1 and 2 can use custom solution, so the programming complexity is lower than Candidate 3.

Table G.3. Feasibility Analysis Matrix.

Feasibility Criteria	Wt.	Candidate 1	Candidate 2	Candidate 3
Operational feasibility: Functionality. A description of to what degree the candidate would benefit the organization and how well the system would work. Political. A description of how well received this solution would be by user management, user, and organization perspective.	30%	Fully supports the requirements in terms of functionality Many of users and management highly accept this solution. They are convinced that this solution will meet all their requirements by using not too long time of construction. It can also be expanded easily to support other function in the future. Score: 100	Same as candidate 1 Many of users an management accept this candidate, as it fully supports their requirement and can be expand to support other function in the future. Score: 100	Same as candidate 1 Many of users an management accept this candidate, as it fully supports their requirement. But they worry about the compatible of the Linux System to the outsourcing information. Score: 100

Table G.3. Feasibility Analysis Matrix (Continued).

Feasibility Criteria	Wt.	Candidate 1	Candidate 2	Candidate 3
Technical feasibility: Technology. An assessment of the matuality, availability (or ability to acquire), and desirability of the computer technology needed to support this candidate. Expertise. An assessment of the technical expertise needed to develop, operate, and maintain the candidate system.	30%	Microsoft Access 2000 can effectively be used to design and build the system. It can easily learn and it is the user friendly system. With the high specification hardware, Microsoft Access 2000 will be able to work effectively for large database. Require hiring a computer company to construct all the system, and come to maintenance weekly. Score: 95	Same as Candidate 2 Score: 95	Paradox7 can easily be used to design and build the system. It can operate the system but the system is a little bit complicate for user to maintenance it by themselves. Score: 85

Table G.3. Feasibility Analysis Matrix (Continued).

Feasibility Criteria	**Wt.**	**Candidate 1**	**Candidate 2**	**Candidate 3**
Economic feasibility: Cost to develop:	30%	Approximately 2,900,000 Score: 95	Approximately 3,300,000 Score: 90	Approximately 2,600,000 Score: 100
Schedule feasibility: An assessment of how long the solution will take to design and implement.	10%	Approximately 3 months Score: 100	Approximately 3 months Score: 100	Approximately 6 months Score: 80
Ranking	100%	97	95.5	87

G.3. Cost/Benefit Analysis for Candidate 1.

Table G.4. Computerized System Cost Analysis for Candidate 1, Baht

Cost items	Years				
	1	2	3	4	5
Fixed Cost					
Hardware cost					
Computer Server	20,000	20,000	20,000	20,000	20,000
Workstation Cost 10 units	50,000	50,000	50,000	50,000	50,000
Dot matrix printer 1 unit	4,000	4,000	4,000	4,000	4,000
Laser Printer 4 units	8,000	8,000	8,000	8,000	8,000
Network Cost	10,000	10,000	10,000	10,000	10,000
UPS 500 VA 6 units	4,200	4,200	4,200	4,200	4,200
Total Hardware Cost	96,200	96,200	96,200	96,200	96,200
Software Cost					
MS Windows XP	13,000	13,000	13,000	13,000	13,000
MS Office 2000 Professional	20,000	20,000	20,000	20,000	20,000
Total Software Cost	33,000	33,000	33,000	33,000	33,000
Implementation Cost					
Software Development Cost	150,000	-	-	-	-
Training Cost	20,000	-	-	-	-
Total Implementation Cost	170,000	-	-	-	-
Total Fixed Cost	299,200	129,200	129,200	129,200	129,200
Operating Cost					
Salary Cost					
Customer Department	40,000	44,000	48,400	53,240	58,564
Delivery Department	28,000	30,800	33,880	37,268	40,995
Research Department	80,000	88,000	96,800	106,480	117,128
Accounting Department	20,000	22,000	24,200	26,620	29,282
Managing Director	25,000	27,500	30,250	33,275	36,603
Maintenance Cost	20,000	22,000	24,200	26,620	29,282
Total Monthly Salary Cost	213,000	234,300	257,730	283,503	311,853
Total Annual Salary Cost	2,556,000	2,811,600	3,092,760	3,402,036	3,742,240

Table G.4. Computerized System Cost Analysis for Candidate 1, Baht (Continue)

Cost items	Years				
	1	2	3	4	5
Office Supplies and Miscellaneous Cost					
Stationary per annual	10,000	11,000	12,100	13,310	14,641
Paper per annual	10,000	11,000	12,100	13,310	14,641
Utility per annual	30,000	33,000	36,300	39,930	43,923
Miscellaneous	30,000	33,000	36,300	39,930	43,923
Total office supplies and Miscellaneous cost	80,000	88,000	96,800	106,480	117,128
Total Annual Operating Cost	2,636,000	2,899,600	3,189,560	3,508,516	3,859,368
Total Computer System Cost	2,935,200	3,028,800	3,318,760	3,637,716	3,988,568

Table G.5. Five Years Accumulated Cost for Candidate 1, Baht.

Year	Total Computer System Cost	Accumulated Cost
1	2,935,200	2,935,200
2	3,028,800	5,964,000
3	3,318,760	9,282,760
4	3,637,716	12,920,476
5	3,988,568	16,909,044
Total	16,909,044	-

Table G.6. The Comparison of the System Cost for Candidate 1, Baht.

Year	Accumulated Manual Cost	Accumulated Computer Cost
1	2,837,500	2,935,200
2	5,957,600	5,964,000
3	9,388,560	9,282,760
4	13,161,466	12,920,476
5	17,310,513	16,909,044

(3) Pay Back Analysis

The following cost items are required, Shown in Table G.7.

Investment Cost:

Hardware Cost	481,000	Baht
Software Cost	165,000	Baht
Software Development cost	150,000	Baht
Training Cost	20,000	Baht
Total Investment Cost	816,000	Baht

Annual Operating Cost:

People-ware cost	2,556,000	Baht
Office Supplies & Miscellaneous cost	80,000	Baht
Total Annual Operating Cost	2,636,000	Baht

Annual Cost:

The formula of annual cost of the Computerized system is

Annual Cost = (Investment Cost/Estimated System Life) + Annual Operating Cost

= (816,000/5) + 2,636,000 = 2,799,200

Saving:

Staff	-	Baht
Office Supplies & Miscellaneous	190,000	Baht
Opportunity cost & Tangible Benefit	2,810,000	Baht
Total Saving	3,000,000	Baht

Then the Payback period is then calculate to judge the profitability of the system as Table G.7. and Figure G.1.

Table G.7. Payback Analysis for Candidate 1, Baht

Cost Items	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Development cost:	816,000						
Operation & Maintenance cost		2,636,000	2,899,600	3,189,560	3,508,516	3,859,368	4,245,304
Discount Factor for 10%	1.000	0.909	0.826	0.751	0.683	0.621	0.564
Time adjusted costs (Present Value)	816,000	2,396,124	2,395,070	2,395,360	2,396,316	2,396,667	2,394,352
Cumulative time- adjusted costs overlife time	816,000	3,212,124	5,607,194	8,002,553	10,398,870	12,795,537	15,189,889
Benefits derived from operation of new system	-	3,000,000	3,300,000	3,630,000	3,993,000	4,392,300	4,831,530
Discount Factor for 10%	1.000	0.909	0.826	0.751	0.683	0.621	0.564
Time adjust benefits (Present Value)	-	2,727,000	2,725,800	2,726,130	2,727,219	2,727,618	2,724,983
Cumulative time-adjusted benefits over life time:	-	2,727,000	5,452,800	8,178,930	10,906,149	13,633,767	16,358,750
Cumulative lifetime time-adjusted cost+benefits::	- 816,000	- 485,124	- 154,394	176,377	507,279	838,230	1,168,862

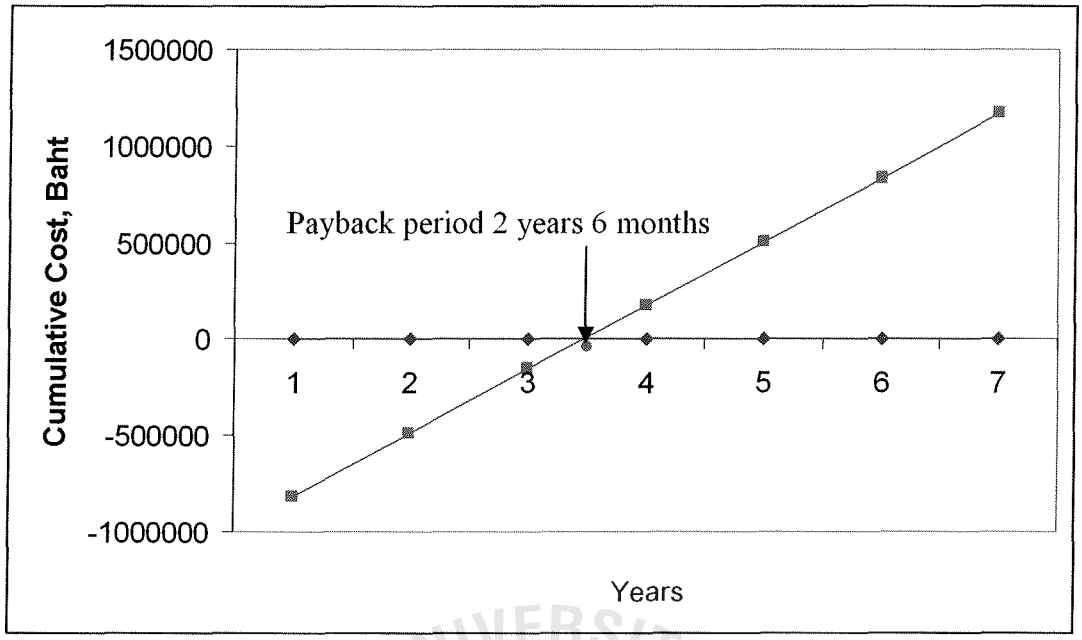


Figure G.1. Payback Period for Candidate 1.

As in Figure G.1. The graph of cumulative cost of computerized system cross the x-axis at 3.5 years or the payback period of the computerized system is 2.5 years.

Moreover, the payback period can be calculated by the formula as follows:

$$P = \text{Last year of negative} + \frac{\text{Cumulative different last negative year}}{\text{Absolute value of cumulate difference (Last negative plus first year positive year)}}$$

Cash flow difference

Where P = Payback Period

= 2+ {(154,394 / (154,394+176,377)}

= 2.466 years or 2 years 6 months

(4) Return-on Investment Analysis (ROI)

Return-on-Investment analysis technique compass the lifetime profitability of alternative solution or projects. The ROI for project is a percentage rate that measures the relationship between the amounts the business get back from an investment and the amount invested. The ROI for a potential project is calculated by using the data from Table G.7. as follows:

ROI = (Estimated lifetime benefits – Estimated lifetime cost) / Estimated lifetime costs

ROI = (16,358,750 - 15,189,889) / 15,189,889

= 7.69%

Therefore, the lifetime ROI is 7.3 percent. Simple division by the lifetime of the system yields and average ROI of 1.53 percent per year.

G.4. Cost/Benefit Analysis for Candidate 2.

Table G.8. Computerized System Cost Analysis for Candidate 2, Baht

Cost items	Years				
	1	2	3	4	5
Fixed Cost					
Hardware cost					
Computer Server	40,000	40,000	40,000	40,000	40,000
Workstation Cost 10 units	100,000	100,000	100,000	100,000	100,000
Dot matrix printer 1 unit	4,000	4,000	4,000	4,000	4,000
Laser Printer 4 units	8,500	8,500	8,500	8,500	8,500
Network Cost	10,000	10,000	10,000	10,000	10,000
UPS 500 VA 6 units	4,200	4,200	4,200	4,200	4,200
Total Hardware Cost	166,700	166,700	166,700	166,700	166,700
Software Cost					
MS Windows 2003 Sever	10,000	10,000	10,000	10,000	10,000
MS Windows XP	13,000	13,000	13,000	13,000	13,000
MS Office 2003 Professional	30,000	30,000	30,000	30,000	30,000
Total Software Cost	53,000	53,000	53,000	53,000	53,000
Implementation Cost					
Software Development Cost	150,000	-	-	-	-
Training Cost	20,000	-	-	-	-
Total Implementation Cost	170,000	-	-	-	-
Total Fixed Cost	389,700	219,700	219,700	219,700	219,700
Operating Cost					
Salary Cost					
Customer Department	40,000	44,000	48,400	53,240	58,564
Delivery Department	28,000	30,800	33,880	37,268	40,995
Research Department	80,000	88,000	96,800	106,480	117,128
Accounting Department	20,000	22,000	24,200	26,620	29,282
Managing Director	25,000	27,500	30,250	33,275	36,603
Maintenance Cost	45,000	22,000	24,200	26,620	29,282
Total Monthly Salary Cost	238,000	261,800	287,980	316,778	348,456
Total Annual Salary Cost	2,856,000	3,141,600	3,455,760	3,801,336	4,181,470

Table G.8. Computerized System Cost Analysis for Candidate 2, Baht (Continue)

Cost items	Years				
	1	2	3	4	5
Office Supplies and Miscellaneous Cost					
Stationary per annual	10,000	11,000	12,100	13,310	14,641
Paper per annual	10,000	11,000	12,100	13,310	14,641
Utility per annual	30,000	33,000	36,300	39,930	43,923
Miscellaneous	30,000	33,000	36,300	39,930	43,923
Total office supplies and Miscellaneous cost	80,000	88,000	96,800	106,480	117,128
Total Annual Operating Cost	2,936,000	3,229,600	3,552,560	3,907,816	4,298,598
Total Computer System Cost	3,325,700	3,449,300	3,772,260	4,127,516	4,518,298

Table G.9. Five Years Accumulated Cost for Candidate 2, Baht.

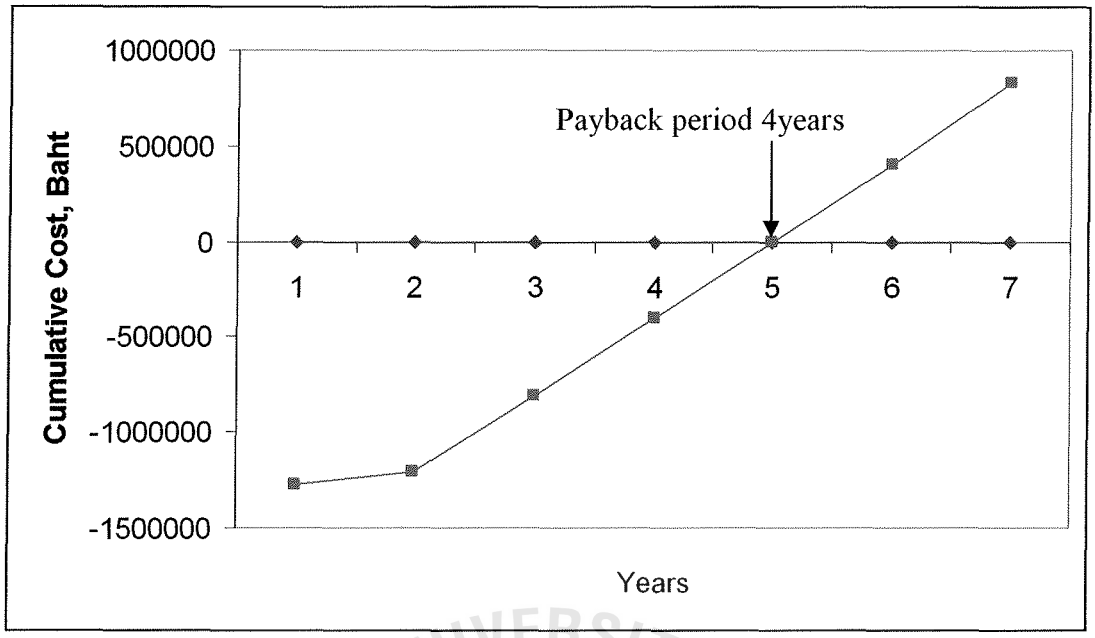
Year	Total Computer System Cost	Accumulated Cost
1	3,325,700	3,325,700
2	3,449,300	6,775,000
3	3,772,260	10,547,260
4	4,127,516	14,674,776
5	4,518,298	19,193,074
Total	19,193,074	-

Table G.10. The Comparison of the System Cost for Candidate 2, Baht.

Year	Accumulated Manual Cost	Accumulated Computer Cost
1	2,837,500	3,325,700
2	5,957,600	6,775,000
3	9,388,560	10,547,260
4	13,161,466	14,674,776
5	17,310,513	19,193,074

Table G.11. Payback Analysis for Candidate 2, Baht

Cost Items	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Development cost:	1,268,500						
Operation & Maintenance cost		2,936,000	3,229,600	3,552,560	3,907,816	4,298,598	4,681,700
Discount Factor for 10%	1	0.909	0.826	0.751	0.683	0.621	0.564
Time adjusted costs (Present Value)	1,268,500	2,668,824	2,667,650	2,667,973	2,669,038	2,669,429	2,640,479
Cumulative time- adjusted costs overlife time	1,268,500	3,937,324	6,604,974	9,272,946	11,941,984	14,611,414	17,251,892
Benefits derived from operation of new system	-	3,380,000	3,718,000	4,089,800	4,498,780	4,948,658	5,443,524
Discount Factor for 10%	1	0.909	0.826	0.751	0.683	0.621	0.564
Time adjust benefits (Present Value)	-	3,072,420	3,071,068	3,071,440	3,072,667	3,073,117	3,070,147
Cumulative time-adjusted benefits over life time:	-	2,727,000	5,798,068	8,869,508	11,942,175	15,015,291	18,085,439
Cumulative lifetime time-adjusted cost+benefits::	-1,268,500	-1,210,324	-806,906	-403,438	190	403,878	833,546



As in Figure G.2. The graph of cumulative cost of computerized system cross the x-axis at 5 years or the payback period of the computerized system is 4 years.

Moreover, the payback period can be calculated by the formula as follows:

$$P = \text{Last year of negative} + \frac{\text{Cumulative different last negative year}}{\text{Cash flow difference}}$$

Absolute value of cumulate difference
(Last negative plus first year positive year)

Where P = Payback Period

= 3+ {(403,438 / (403,438+190)}

= 3.999 years or 4 years

BIBLIOGRAPHY

1. Forouzan, Behrouzan A., Data Communication and Networking, Second Edition.,San Francisco, McGraw-Hill, 1999
2. Mantel, Samuel J., Jack R. Meredith, Scott M. Shafer, and Margaret M. Sutton. Project Management in Practice, New York, John Wiley & Sons, Inc., 2001
3. Whitten, Jeffrey L., Lonnie D. Bentley, and Kevin C. Dittman. System Analysis and Design Methods, Fifth Edition. Boston, McGraw-Hill, 2000.
4. กิตติ ภักดีวัฒนะกุล และ จำลอง ครูอุตสาหะ. Visual Basic for Programmer, Fifth Edition. Bangkok: KTP COMP & CONSULT Company Limited, 2543.
5. กิตติ ภักดีวัฒนะกุล และ จำลอง ครูอุตสาหะ. Visual Basic 6 for Database, Fourth Edition. Bangkok: KTP COMP & CONSULT Company Limited, 2543.
6. สมศักดิ์ ศรีขจรเกียรติ. Advance Visual Basic. Bangkok: Bibliophile Publishing, 2544.